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A FISH AND WILDLIFE SURVEY OF GUATEMALA

SPECIAL SCIENTIFIC REPORT: WILDLIFE No. 5

UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

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United States Department of the Interior
Oscar L. Chapman, Secretary
Fish and Wildlife Service
Albert M. Day, Director

Special Scientific Report - Wildlife
No. 5

A FISH AND WILDLIFE SURVEY OF GUATEMALA

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Explanatory Note

The series embodies results of investigations, usually of restricted scope, intended to aid or direct management or utilization practices and as guides for administrative or legislative action. It is issued in limited quantities for the official use of Federal, State or cooperating agencies and in processed form for economy and to avoid delay in publication.

Washington, D. C.
June 1950

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A REPORT ON THE FISH AND WILDLIFE SURVEY OF GUATEMALA BY A MISSION OF THE UNITED STATES GOVERNMENT 1946 and 1947

INTRODUCTION

The fish and wildlife survey of Guatemala, conducted during the periods March through May of both 1946 and 1947, was made by a Mission of the Fish and Wildlife Service, United States Department of the Interior, pursuant to the terms of an intergovernmental agreement concluded by representatives of the Government of the United States of America and the Government of the Republic of Guatemala. The project was organized as part of the program of the Government of the United States of America for cooperation with American Republics.1/

Personnel of the Mission were Dr. George B. Saunders, biologist, Division of Wildlife Research, Ancil D. Holloway, aquatic biologist, Division of Game-fish and Hatcheries, and Charles O. Handley, Jr., biologist, Office of Foreign Activities, all of the Fish and Wildlife Service, and Dr. Robert R. Miller, Assistant Curator, Division of Fishes, United States National Museum. Dr. Saunders served as Chief of the Mission. He, Mr. Holloway, and Dr. Miller participated in the survey both years; Mr. Handley assisted during 1947. The Mission was organized by and functioned under the administrative direction of Dr. H. J. Deason, Chief, Office of Foreign Activities, Fish and Wildlife Service.

The Republic of Guatemala, Ministry of Agriculture, assigned three members of its newly organized Department of Game and Fish to assist in the survey each year. In 1946, under the administrative direction of Dr. Roberto Guirola, Minister of Agriculture, and Sr. Gabriel Asturias Moulton, Chief, Division of Livestock, the appointments of Sr. Julio Midence, Sr. Fernando Barneond, and Sr. Julio Mendizabal as field associates, were made. In 1947, under Sr. Francisco V. Calderón, Minister of Agriculture, and Sr. Lisandro Castillo, Chief, Division of Livestock, Sr. Julio Midence, Sr. Ricardo Camacho Bory, and Sr. Rigoberto Chacón were the Guatemalans on the field staff. Unfortunately, illness forced Sr. Chacón to leave the survey after two weeks.

The Mission operated as two field units, one which studied the kinds, distribution, and general ecology of fishes, as well as the ecology of the waters in which they occurred, and a second which studied the game birds and mammals, their distribution, and relative abundance.

In one unit, Ancil D. Holloway made an appraisal of the lakes and streams, their fish populations, and the opportunities for introduction of better species for food and game. Dr. Robert R. Miller studied the kinds, distribution, and relative abundance of fishes, emphasizing taxonomy. They were assisted in 1946 by Sr. Midence and Sr. Mendizabal, and in 1947 by Sr. Midence.

In another unit, Dr. George B. Saunders investigated chiefly the game birds of the Republic, while Charles O. Handley, Jr., in 1947, studied the mammals. In 1946, Sr. Barneond assisted throughout the period of field work; in 1947, Sr. Chacón and Sr. Camacho Bory assisted on several trips.

In general the program consisted of field investigations in typical localities and regions, and the questioning of well-informed residents familiar with fish and game conditions. Field work was conducted in every Department of the Republic. Travel was chiefly by truck, but that in the Petén and along the coasts was accomplished by aerial reconnaissance, as time was not available for ground studies.

1/ Authorized by the following laws of the United States: Act of May 3, 1939 (5 U. S. Code, Sec. 118e), and Act of August 9, 1939 (22 U. S. Code, Sec. 501).

Although field research was limited to a total of slightly more than four months during the two years, many of the important areas were visited, information was obtained on most of the fishes, game birds, and mammals, and many specimens, especially of fishes, were obtained. A list of localities where observations were made is included later in this report.

A detailed analysis of these studies is given by species in the subsequent pages.

The present report summarizes much of the information obtained in the survey, especially that on wildlife. The detailed report listing all of the kinds of fishes and their distribution in the Republic probably will not be completed for several years because of the great amount of work required to identify the many thousands of specimens.

The first section, prepared by Dr. Saunders, is primarily a catalog of the many kinds of game birds and shorebirds of the Republic, together with general comments on hunting, game laws, the geographical regions and their game birds. It is based largely on field studies made by Dr. Saunders, assisted by Mr. Handley and Sr. Barneond, and on information obtained by them from Guatemalan hunters.

Undoubtedly the section of the present report of the most immediate interest to Guatemala is that prepared by Mr. Holloway describing the stream and lake survey, together with its findings and recommendations. The field investigations were conducted by Mr. Holloway with the assistance of Dr. Miller, Sr. Midence, and Sr. Mendizabal. As he has stated, if the Republic requires further technical information regarding the work done on fish cultural methods and equipment which may be used in the future, the United States Government, through the Fish and Wildlife Service, will be very glad to lend its assistance.

The third section describes the mammals of the Republic; includes a systematic list of these animals, and a key for their identification. It was written by Mr. Handley on the basis of work done by him with the assistance of Sr. Camacho Bory and Sr. Chacón.

The Mission received much valuable assistance from many Guatemalans and other residents of the Republic. It is especially indebted to those officials who made possible the field surveys: American Ambassador Edwin J. Kyle; Sr. Roberto Guirola, former Minister of Agriculture; Mr. Graham S. Quate, American Agricultural Attaché; and Sr. Gabriel Asturias M., former chief, Dirección General de Ganadería.

In 1947, the continuation of the Mission was made possible by the interest and cooperation of Minister of Agriculture Francisco Valdes Calderón, assisted by the then chief of the Dirección General de Ganadería, Sr. Lisandro Castillo; and American Ambassador Edwin J. Kyle.

The following individuals and organizations also gave much appreciated assistance to the Mission:

Comisión de Caza y Pesca, especially Senores Carlos Echeverría, Roberto Fischer, and Antonio Iglesias h., also Ricardo Samperio, R. G. Molina, C. de la Hoz, and Guillermo Armas.

Compania Agrícola de Guatemala, especially Mr. William L. Taillon, manager, and Messrs. A. L. Bump, L. S. Greenberg, Don Harris, D. Y. Jones and other personnel at Tiquisate, and Mr. George Austin at Puerto Barrios.

Governors of the Departments and officials of the Guatemalan Army.

Instituto de Agropecuario Nacional, especially Mr. Howard Love and Dr. William Cowgill, as well as other members of the staff.

Ministerio de Agricultura: in addition to those officials already mentioned, the following personnel assisted in many ways: Senores Julio Bianchi, Julio Arriola G., and Augusto Barrios.

The American Embassy: In addition to the officials mentioned previously, the following also gave valuable assistance: Col. Arthur Binney, Col. Frederick H. Sherwood, and Col. Devine. Members of the regular staff, especially Mr. Graham Quate, Agricultural Attaché, who has already been mentioned, and his secretary, Miss Josephine Wilson, were particularly helpful.

Personnel at the U. S. Army Air Base, San José, especially Major R. McElroy and Lt. Arthur Larkin, gave us valuable assistance.

Senores: Alfonso Algara, George Brol, Pedro Brol, Edmundo Brol, E. H. Carrette, Edgar Davies, Percy Davies, Carlos Dorión, Otto Dorión, Manuel M. Herrera, Juan de la Hoz, Denis Koester, G. G. Neutze, Alfredo Schlesinger, Cloyd Smith, John G. Smith, Ledyard Smith, O. A. Taintor, Neil T. McMillan.

Dr. J. Van Tyne of the University of Michigan, Museum of Zoology, and Mr. Allen J. Duvall, Fish and Wildlife Service, supplied some of the descriptive data on tinamous.

To all these individuals and organizations we wish to express our gratitude and appreciation.

THE GAME BIRDS AND SHOREBIRDS OF GUATEMALA

George B. Saunders, Biologist
Fish and Wildlife Service

Introduction

This section of the report is based largely on field studies made in Guatemala by the writer, assisted by Mr. Handley, Mr. Barneond and other members of the Department of Game and Fish who were assigned to the survey. In addition to the field investigations, a review was made of many specimens in the collections of the United States National Museum and the Fish and Wildlife Service, and of the available literature on these birds. Many of the findings, including references from the literature, have been embodied in the report.

A distribution map of the wildlife of Guatemala includes the following seven general regions: (1) the Pacific coastal plain, (2) the Pacific cordillera, (3) the interior highlands known as the Altos, (4) the mountainous region of Vera Paz, (5) the relatively arid interior valleys, (6) tropical lowlands of the Petén, and (7) the Caribbean lowlands of (chiefly) the Department of Izabal. Comments are made regarding several of these regions and the kinds of game birds available there.

Suggestions concerning wildlife hunting regulations as well as lists of bird migrants to Guatemala from other countries are presented. The principal part of this section is the annotated list of the game birds and shorebirds of the Republic, which includes much information of interest to game administrators and hunters.

Some of the information included in this section also pertains to that on mammals prepared by Mr. Handley. The itinerary on pp. 17-18 applies to both bird and mammal studies.

Wildlife Regions of Guatemala

The Pacific Coastal Plain.--Probably the finest general area for the hunting of both mammals and birds is on the Pacific coastal plain, especially northwest of the line from Esquintla to San José. A great part of this area is dense forest crossed by a series of rivers. Several roads, as well as scores of trails, give access to the forest and to the many farms and clearings within and along its edges. There are large savannas and extensive swamps in this general region. Some of the best hunting for the big cats is to be found in these broad areas of grassland or other open country more or less surrounded by forest.

The principal game birds of this region are the curassow or pajuil (Crax rubra rubra); the guan or pava (Penelope purpurascens purpurascens); the chachalaca or chacha (Ortalis vetula leucogastra); the tinamou or perdiz (Crypturellus cinnamomeus subsp.) and the ducks, pigeons, and doves that occur there.

This coastal region will continue to afford good hunting as long as the forest remains to provide protective cover for its many game species. With continued agricultural development, the area of forest is being reduced, but at the present time this clearing is

chiefly in or near the piedmont area rather than nearer the coast. The rapidly increasing human population of the Republic, however, will probably cause the clearing of most of the coastal forest within the next several centuries to provide needed agricultural land.

The Pacific Cordillera.--The slopes of the cordillera which parallels the Pacific are chiefly dense forest, some of a lush, cloud-forest type. A number of species of game birds occur there, but hunting them does not yield very satisfactory results in terms of meat. For the hunter whose principal interest is difficult game, and who enjoys stalking his quarry and studying their habits as well as attempting to shoot them, these birds of the mountain forests are fascinating subjects.

On the lower slopes and foothills, curassows or pajuiles (Crax) are reported to occur locally, but we did not observe any. The pavas (Penelope) are also said to be fairly common in some localities, up to at least 4,000 feet. Both of these species, however, are much more numerous and easier to hunt in the drier forests of the Pacific coastal plain.

Tinamous were heard calling in several localities, especially in the cloud forest on the Finca Helvetia at about 5,000 feet, but none could be obtained to identify the species. They may have been Boucard's tinamou, as that species prefers the dense forest.

There are two partridges, the long-tailed (Dendrortyx leucophrys subspecies) and the long-clawed (Dactylortyx thoracicus chiapensis) to be found in these forests. The former occurs from about 1,000 feet up to approximately 6,000 feet. Its habitat is not only in the forest, but also out in the second growth hualtales. The latter occurs in the higher, dense forests, usually above 6,000 feet. Both kinds are difficult to shoot, chiefly because of the density of the woodland in which they are found.

From about 5,000 feet up to 8,000 feet, and probably even higher, the black chachalaca (Penelopina nigra) lives. Like the two kinds of partridges, it is usually not seen until flushed, and then there is only a momentary glimpse before it disappears again. To hunt these mountain species successfully, a bird dog should be used, for in the heavy forest and dense undergrowth it is usually impossible to see them before they fly, and if shot they are apt to be lost in the rank herbage.

The ruddy quail dove (Oreopeleia montana) and the other doves and pigeons of these mountain forests are more often seen than the preceding game birds, but their numbers are few in comparison to those of related species present on the Pacific coastal plain.

Of all these mountain game birds, the horned turkey or faisán (Oreophasis derbianus) prefers the highest elevations. Seldom is it found below 7,500 feet. The dense rain forest is its home, and hunters have seen it as high or higher than 10,000 feet on the peaks of San Lucas, Fuego, Zunil, Tacana, and Tajamulco.

The Interior Highlands.--In former years there was much more game in the highlands, but the elimination of the forest from large areas, the destructive effects of burning and soil erosion, night hunting with headlights, the widespread trapping of game birds, and other adverse conditions have greatly reduced these wildlife populations. Wooded slopes on many of the mountains, especially the steeper ones, and those on light soil, should never have been cleared.

The increase of game in the central highlands would depend primarily upon the establishment of good land-use practices with regard to the conservation of forests and soils. This is the basic need. Once these methods are adopted, wildlife will increase. The enforcement of laws prohibiting hunting at night by means of headlights, as well as that prohibiting the trapping of game, would bring about an additional increase.

Since so many of the hunters, who would like to see the supply of game increased, live in the highlands, it seems all the more advisable to emphasize in this report the fundamental advisability of the Government's establishing and maintaining a sound and progressive policy regarding the conservation of forests and soils. The future of the Republic's economy will depend greatly upon the promptness with which these conservation methods are adopted. One of the many desirable results of such a program will also be a gradual increase in the wildlife population.

Petén Lowlands.--Because of its location and individuality, this region is discussed separately from the other Caribbean lowlands. Many of its birds and mammals are restricted in distribution to the Yucatán peninsula, so occur only in this one Department of the Republic.

Lake Petén and the town of Flores comprise the population center of the region. Poptún is the principal town in the southeastern part of the Petén.

Hunting is done by residents of the towns and villages, by the more isolated settlers and by the chicle gatherers (chicleros). The principal game birds sought are curassows (pajuiles), guans (pavas), ocellated turkeys, tinamous, chachalacas, and quail.

The commercial hunting of crocodiles is important in this sector.

Caribbean Lowlands, exclusive of the Petén.--Because of the small human population in this region, there is relatively little hunting of game birds. The most hunting, outside of the Petén, is done on the lower Motagua River, especially below Quiriguá. Hunters there usually are in search of deer, wild pigs, or other game mammals, but combine with this sport the shooting of curassows (pajuiles), guans (pavas), chachalacas, tinamous, ducks, pigeons, doves, and other birds.

In the future, if the Lake Izabal area is developed as a tourist center, because of its scenic attractions and fine fishing, the good hunting there will also be important.

Game Birds and Shorebirds

The birds of the Republic which should be classed as game are those which are sufficiently large and well flavored to be of value as food, and sufficiently numerous and widely distributed to be in no danger of extermination. Those which are considered to be more valuable for other economic purposes should not be classed as game.

In the following detailed list of some of the birds of Guatemala, not all are game species to be hunted. The shorebirds, for example, because of their scarcity or small size, are not to be considered as game birds. They should have full legal protection.

The majority of the birds of the Republic are not discussed in detail in this report, for they are not game species. Their great value as destroyers of insect pests and their other useful characteristics fully justify their complete protection by law the year-round.

Persons who desire information on these non-game species of birds of the Republic should consult the list of references at the end of this report. Unfortunately, there are no fully illustrated books on the birds of Guatemala or adjacent countries, but some of the common species of the Republic are described in a book on the birds of Panamá by Sturgis. The famous books of Salvin and Godman on the biology of Mexico and Central America, including four on birds, are in the collection at the Biblioteca Nacional in Guatemala City.

Species which are migratory, breeding in the United States of America or farther north and migrating to Latin America for the winter, have been illustrated in a number of publications, some of which are listed in the references at the end of this report.

For persons who may be particularly interested in these bird migrants from the north, some of the publications available from the United States Government Printing Office in Washington, D. C., will be helpful.

In the United States, Canada, and Mexico, most of the migratory species are protected by international treaties between these nations. These treaties are for the purpose of securing international cooperation and coordination in the protection of migratory birds, rather than to leave it as an individual responsibility of each of the many states and provinces of these countries, some of which, through lack of understanding of the problem, might fail to pass adequate protective legislation. Such national and international protection is especially important for migratory game birds like the ducks, Wilson's snipe, and mourning dove, which cross many of the smaller political divisions, such as states and provinces, in their migrations. Some of these migratory game birds journey southward to Guatemala and even farther each winter.

One family of migratory birds for which there is special need of protection is that of the herons and egrets (Ardeidae), which has suffered greatly in the past because of lack of laws prohibiting their being killed. At one time their numbers were very greatly reduced in the United States and several species were almost extirpated in some localities. More recently, as a result of legal protection, they have increased markedly. The herons and egrets of the Republic are not listed in this report, for they have never been considered to be game birds. Nevertheless, they should be fully protected because of their economic and esthetic value.

Tinamous

There are two genera of tinamous present in Guatemala, Tinamus and Crypturellus. The former is represented by Tinamus major robustus Sclater and T. major percautus Van Tyne, both plump, heavy-bodied terrestrial birds about the size of a guinea hen, and weighing from about 900 to 1,135 grams. They inhabit the dense tropical forests.

The genus Crypturellus has three species in Guatemala, Crypturellus soui meserythrus (Sclater), C. boucardi boucardi (Sclater) and C. cinnamomeus (Lesson). Of the last there are two subspecies recorded, and possibly a third in occurrence within the Republic. All of the tinamous in this genus here represented are much smaller than Tinamus major spp. Several specimens of C. cinnamomeus soconuscensis from San José and Tiquisate weighed about 400 grams.

All are sought after as game birds, and evidently many are taken for food by shooting and trapping. However, their wariness and solitary habits give them a high degree of protection. Natural mortality factors seem to play by far the greater part in determining their numbers, and it is doubtful that shooting has much of a reductional effect except in the settled areas where they are hunted intensively.

The degree to which they might lie to a bird dog was not ascertained. So seldom are dogs of this type used by hunters in these localities that the question has little practical significance at present.

Some of them can be decoyed by imitating one or more of their whistled calls, but this requires not only an accurate repetition of their whistles but also much patience on the part of the hunter as the bird's cautious approach may last a quarter hour or more. Judging from comments of resident hunters, this method seems to be employed very seldom.

Much of the hunting of tinamous is done during the dry season, when visibility through the undergrowth is better and they can be heard walking among the dead leaves. By walking quietly along woodland roads and trails and stopping at places where visibility is good, the hunter will occasionally hear one pattering around as it feeds on seeds, insects, and other small forms of animal life in the leaf mold, and, if fortunate, will be successful in shooting it.

Migratory Waterfowl

Because of the present critical situation of the waterfowl of North America, special attention was directed to an inventory of migratory species present in Guatemala, and to conditions affecting their distribution and abundance.

Neither in 1946, nor in 1947, could the Mission begin field work earlier than about March 1st. However, during the period January 26 to February 10, 1947, and in January 1948, special flights were made to Central America as a part of the continental waterfowl survey, and several days devoted to aerial reconnaissance of waterfowl wintering grounds in Guatemala.

Practically all of the ducks that are present in the Republic during the period from October through March are migrants from Canada, Alaska, and the United States. Only the muscovy duck (pato real) and the black-bellied tree duck (pijiji) breed there, but they are also present during the remainder of the year.

Apparently the most common species during the period from October to March are the pintail, blue-winged teal, lesser scaup, and black-bellied tree ducks.

The Pacific coastal plain, with its coastal lagoons and marshes, is the only area of the Republic very important to migrant and wintering ducks. This evaluation is based on observations made during the reconnaissance flights and ground surveys, together with reports from local hunters in various parts of the Republic.

Most of the duck hunting is done on the Pacific coastal plain, where most of the waterfowl are to be found at marshes and lagoons, or the lower reaches of the rivers. The best hunting opportunities are near Papaturro, Jicaro, Champerico, Tahuesco, Sipacate, below Tiquisate, on the lower Río Samalá, near Ocós, San José, and Iztapa. The largest marsh area is that north of the Chiquimulilla Canal, between Iztapa, Jicaro, and Papaturro. Most of the waterfowl migration occurs along this coast, so hunters who prefer duck shooting will do well to frequent one or more of these localities.

Lakes Atescatempa and Retana, and smaller waters near San Pedro and Monjas, are popular hunting places, even for shooters from Guatemala City. In recent years, Retana, which formerly had been one of the best waterfowl lakes in the Republic, has been dry much of the time and has afforded little hunting.

Lake Guija had a population of several hundred ducks, mostly pintails, blue-winged teal, shovellers, and lesser scaup, when we scouted it by plane in January, 1947, but it is difficult of access except by rail.

Marshes and lakes of the Petén provide an extensive area of aquatic habitats, but observations and reports indicate that relatively few ducks utilize them at any time of year.

Lake Izabal, the largest in the Republic, apparently attracts very few ducks, although it affords many square miles of attractive feeding grounds.

At the time of our aerial reconnaissance in January 1947, there were no ducks observed on Lake Izabal or the Golfete, and fewer than a hundred on Lake Petén.

Several small lagoons near the mouth of the Motagua River were reported to afford good duck hunting, but when we flew over this sector in January, relatively few ducks were seen. They may be more numerous there in November and December during migration.

All observations and reliable reports indicated that the flights along the Caribbean coast and lowlands are small as compared to those on the Pacific coast.

There are small, scattered flights across the highlands, as attested by the presence of limited numbers of ducks on the interior lakes such as Amatitlán and Atitlán. Some of the best hunting opportunities are at several of the smaller interior lakes, especially at Lake Retana and others in the vicinity of Monjas, Department of Jalapa. However, these basins have been very low or completely dry during the past few years.

At the time ground studies were made, the spring migration had been underway for more than a month, and there was no way to estimate the number of ducks present in México which might have wintered in Central or northern South America, and passed through Guatemala enroute. There is little doubt, however, that at least several million ducks pass along this coast during migration, and that some of them avail themselves of feeding and resting grounds in the Republic.

According to several experienced duck hunters with whom we talked, blinds are never used and they had never seen others use them. Pass shooting and stalking were the methods usually employed. None of the fifty or more hunters interviewed used decoys, and only two used retrievers.

During the recent war, when many U. S. soldiers were based at Guatemala City and San José, much more hunting was done, especially near San José.

As with other sports requiring shotguns and ammunition, duck hunting is expensive, and requires that the shooter possess the necessary arms permits. These conditions restrict greatly the number of hunters in Guatemala.

No recommendations for waterfowl management are believed necessary at this time, except insofar as hunting regulations are concerned. It will be advisable to establish a duck season which closes by January 31st, in order to reduce spring shooting. The total amount of duck hunting done is small, but it should be restricted to the period October 1 through January 31, to end before the breeding season begins.

Quail

Most of the quail shooting is done in the highlands, not far from the capital. Favorite localities for hunting are near Zumpango, Chimaltenango, San Juan Sacatepequez, Antigua and vicinity, in areas where there are many grain fields, grassy slopes, and open woodland.

There are a number of enthusiastic and experienced quail hunters in Guatemala City, several of whom have bird dogs which they keep for this sport. According to their statements, an average day's hunt yields a bag of about five quail per hunter. Both the bobwhite and the ocellated quail occur in the highlands, but the latter is the more common of the two near the capital.

Reports from hunters, plus our field observations, indicated that the quail nest during the months of April through August. By September they are reported to be in coveys.

Since our field studies were terminated in May, there was no opportunity to follow the nesting success of these birds, nor were we present when the majority of the shooting began in September.

Information obtained from hunters and finca owners indicated that many quail are trapped by farmers and other residents on the land. The several traps observed during our field work were simple devices, either figure-fours with basket, net, or rock above, or a baited snare, but in the aggregate they catch many quail.

Among the proposed hunting regulations recommended by the Fish and Game Committee of the Ministry of Agriculture, is one (Article 34) which would prohibit the taking of quail and partridges of the Republic by means of traps. This proposal should be made a law, as illegal trapping is largely responsible for the great reduction in the number of quail in many localities, particularly in the more densely settled highlands.

The proposed law restricting the open season on quail to the period September 1 through February should also be adopted. The killing of many quail during the breeding season is largely responsible for their alarming decrease and even extermination in some localities.

Many persons have asked how, other than by regulations, the quail in certain areas could be increased. Some have wondered whether it would be advisable to introduce bobwhite quail from the United States for purposes of restocking. Under present conditions, it is recommended that no species of quails be introduced from other countries. Birds of other countries would not be satisfactorily adapted to conditions in Guatemala, and, in addition, there is always the danger of introducing additional parasites and diseases which would cause increased mortality among the native birds. Far more probably can be accomplished by the improvement of conditions affecting the number of native species.

It is entirely feasible for land owners to increase the quail on their property, provided some quail are already present and the owners are willing to provide an adequate environment for these birds. To do this they need only to follow the basic recommendations for quail management such as that outlined by game agencies in the southwestern United States of America. A practical bulletin on this subject is "Upland Game Management," publishedby the Wildlife Management Institute, which can be obtained free by interested Guatemalans by writing individually to the Institute at Washington, District of Columbia, U. S. A.

In some areas where quail have been extirpated and where local interest in their reintroduction is sufficiently strong, it will be desirable for field personnel of the Department of Fish and Game to obtain such planting stock by live trapping these birds where they are locally more numerous, as, for example, in the southeastern part of the Republic, in localities where little quail hunting is done.

Several other kinds of quail, particularly bobwhites (Colinus), are found in the Republic. One lives in the highlands near Nentón, another (Nigrogularis) is a resident of Petén savannas, a third is found in the arid interior valleys of the upper Motagua and Baja Vera Paz, and a fourth, the spotted wood quail, inhabits the interior mountain forests up to about 6,500 feet.

Two other kinds, both bobwhites, are believed to occur in western Guatemala adjacent to Chiapas, as they have been recorded almost to the boundary. They are listed in this report as "hypothetical" residents of the Republic.

Doves and Pigeons

Guatemala has a great variety of doves and pigeons, about twenty kinds in all, of which about fourteen can be classed as game birds. Of these, the ones most available to hunters from Guatemala City and other centers of population are the mourning dove (Zenaidura macroura subsp.), white-winged dove (Zenaida asiatica subsp.), and red-billed pigeon (Columba flavirostris flavirostris). In the higher country, especially in some of the oak and pine forests, the band-tailed pigeon (Columba fasciata fasciata) is a common species. All of these birds occur in flocks during the period of October through March, especially with the arrival of large flights of mourning doves, white-winged doves, and red-billed pigeons each fall and spring in parts of the Republic.

Migrant mourning doves from the United States pass across the highlands and into the interior valley, as well as along the coasts. With fields so widespread in the Altos, mourning doves are of common occurrence in many localities, though nowhere in Guatemala are they as numerous as in central Mexico.

Migrant eastern white-winged doves are chiefly to be found passing along the Pacific coastal plain enroute eastward in the fall and westward in the spring. Some winter there, principally in stream valleys near grain raising areas.

White-winged doves are resident in many localities in Guatemala, but most of them are of a geographic subspecies other than the one (Zenaida asiatica asiatica) which migrates from eastern México and southern Texas in large numbers and winters on the Pacific coastal plain.

Red-billed pigeons are generally abundant on the Pacific coastal plain, but no information was obtained as to how many of the flocks observed in flight were migrants from México. The species is a common breeder in the lowlands and piedmont of the Pacific drainage, so probably many of the wintering flocks are of resident individuals.

The hunting of these birds should be restricted to the larger species. The killing of the smaller ones, such as the ground doves, Inca doves, and other so-called tortolas or tortolitas should be prohibited by law. Their value about the home and farm far outweighs that for food or sport.

In general, the best dove hunting is available in and near the agricultural areas of the highlands and of the Pacific Coast. Dove hunting in the heavy forests is ordinarily not very successful because of the fewer birds and greater difficulties in shooting.

The hunting season on doves and pigeons should be limited by law to the months of September through February, for during much of the remainder of the year the resident birds of this family are breeding. They lay only one or two eggs per clutch, and because of this low rate of reproduction do not increase their numbers as rapidly as many other game birds. This characteristic is an additional reason for protecting them by law during their breeding season.

Birds Which Occur in Both the United States and Guatemala

Birds Which Occur in Guatemala Only as Migrants or Winter Visitants, And Which Breed in the United States, Canada, or Alaska

Colymbus caspicus californicus (Heermann)	Eared Grebe
Podilymbus podiceps podiceps (Linnaeus)	Pied-billed Grebe
Pelecanus erythrorhynchus Gmelin	White Pelican
Ardea herodias herodias Linnaeus	Great Blue Heron
Dichromanassa rufescens rufescens (Gmelin)	Reddish Egret
Butorides virescens virescens (Linnaeus)	Eastern Green Heron
Nycticorax nycticorax hoactli (Gmelin)	Black-crowned Night Heron
Nyctanassa violacea violacea (Linnaeus)	Yellow-crowned Night Heron
Nyctanassa violacea bancrofti Huey	Bancroft's Night Heron
Botaurus lentiginosus lentiginosus (Montagu)	American Bittern
Mareca americana (Gmelin)	Baldpate
Anas acuta tzitzihoa Vieillot	American Pintail
Anas carolinensis Gmelin	Green-winged Teal
Anas discors Linnaeus	Blue-winged Teal
Spatula clypeata (Linnaeus)	Shoveler
Aythya collaris (Donovan)	Ring-necked Duck
Aythya valisineria (Wilson)	Canvasback
Aythya affinis (Eyton)	Lesser Scaup
Oxyura jamaicensis rubida (Wilson)	Ruddy Duck
Elanus leucurus majusculus Bangs and Penard	White-tailed Kite
Elanoides forficatus forficatus (Linnaeus)	Swallow-tailed Kite
Ictinia misisippiensis (Wilson)	Mississippi Kite
Accipiter striatus velox (Wilson)	Sharp-shinned Hawk
Accipiter cooperii (Bonaparte)	Cooper's Hawk
Buteo jamaicensis calurus Cassin	Western Red-tailed Hawk
Buteo platypterus platypterus (Vieillot)	Broad-winged Hawk
Buteo swainsoni Bonaparte	Swainson's Hawk
Buteo albicaudatus hypospodius (Gurney)	Sennett's White-tailed Hawk
Circus hudsonius (Linnaeus)	Marsh Hawk
Pandion haliaetus carolinensis (Gmelin)	Osprey
Falco peregrinus anatum Bonaparte	Duck Hawk
Falco femoralis septentrionalis Todd	Aplomado Falcon
Falco sparverius sparverius Linnaeus	Eastern Sparrow Hawk
Rallus limicola limicola Vieillot	Virginia Rail
Porzana carolina (Linnaeus)	Sora Rail
Laterallus jamaicensis pygmaeus (Blackwall)	Black Rail
Haematopus palliatus palliatus Temminck	American Oyster-catcher
Charadrius hiaticula semipalmatus Bonaparte	Semipalmated Plover
Charadrius wilsonia beldingi (Ridgway)	Belding's Plover
Charadrius vociferus vociferus Linnaeus	Killdeer
Pluvialis dominica dominica (Müller)	American Golden Plover
Squatarola squatarola (Linnaeus)	Black-bellied Plover
Aphriza virgata (Gmelin)	Surf-bird
Arenaria interpres morinella (Linnaeus)	Ruddy Turnstone
Capella gallinago delicata (Ord)	Wilson's Snipe
Numenius americanus americanus Bechstein	Long-billed Curlew
Numenius phaeopus hudsonicus Latham	Hudsonian Curlew
Numenius borealis (Forster)	Eskimo Curlew*
Bartramia longicauda (Bechstein)	Upland Plover
Actitis macularia (Linnaeus)	Spotted Sandpiper
Tringa solitaria solitaria Wilson	Eastern Solitary Sandpiper
Catoptrophorus semipalmatus inornatus (Brewster)	Western Willet
Totanus melanoleucus (Gmelin)	Greater Yellow-legs
Totanus flavipes (Gmelin)	Lesser Yellow-legs

* Nearly extinct

Erolia melanotos (Vieillot)	Pectoral Sandpiper
Erolia minutilla (Vieillot)	Least Sandpiper
Limnodromus griseus griseus (Gmelin)	Eastern Dowitcher
Micropalama himantopus (Bonaparte)	Stilt Sandpiper
Ereunetes mauri Cabanis	Western Sandpiper
Limosa fedoa (Linnaeus)	Marbled Godwit
Crocethia alba (Pallas)	Sanderling
Recurvirostra americana Gmelin	Avocet
Himantopus mexicanus (Müller)	Black-necked Stilt
Steganopus tricolor Vieillot	Wilson's Phalarope
Lobipes lobatus (Linnaeus)	Northern Phalarope
Larus atricilla Linnaeus	Laughing Gull
Larus pipixcan Wagler	Franklin's Gull
Larus heermanni Cassin	Heermann's Gull
Gelochelidon nilotica aranea (Wilson)	Gull-billed Tern
Gelochelidon nilotica vanrossemi Bancroft	Western Gull-billed Tern
Sterna forsteri Nuttall	Forster's Tern
Sterna hirundo hirundo Linnaeus	Common Tern
Sterna albifrons antillarum (Lesson)	Least Tern
Sterna albifrons browni Mearns	Brown's Tern
Thalasseus maximus maximus (Boddaert)	Royal Tern
Thalasseus sandvicensis acuflavidus (Cabot)	Cabot's Tern
Chlidonias niger surinamensis (Gmelin)	Black Tern
Rynchops nigra nigra Linnaeus	Black Skimmer
Zenaidura macroura carolinensis (Linnaeus)	Eastern Mourning Dove
Zenaidura macroura marginella (Woodhouse)	Western Mourning Dove
Coccyzus americanus americanus (Linnaeus)	Yellow-billed Cuckoo
Coccyzus erythropthalmus (Wilson)	Black-billed Cuckoo
Speotyto cunicularia hypugaea (Bonaparte)	Western Burrowing Owl
Asio flammeus flammeus (Pontoppidan)	Short-eared Owl
Caprimulgus carolinensis Gmelin	Chuck-will's-widow
Caprimulgus vociferus vociferus Wilson	Eastern Whip-poor-will
Caprimulgus vociferus arizonae (Brewster)	Stephen's Whip-poor-will
Chordeiles minor hesperis Grinnell	Pacific Nighthawk
Chordeiles acutipennis texensis Lawrence	Texas Nighthawk
Chaetura vauxii vauxii (Townsend)	Vaux's Swift
Archilochus colubris (Linnaeus)	Ruby-throated Hummingbird
Megaceryle alcyon alcyon (Linnaeus)	Eastern Belted Kingfisher
Sphyrapicus varius varius (Linnaeus)	Yellow-bellied Sapsucker
Sphyrapicus varius nuchalis Baird	Red-naped Sapsucker
Tyrannus tyrannus (Linnaeus)	Eastern Kingbird
Tyrannus verticalis Say	Arkansas Kingbird
Tyrannus vociferans vociferans Swainson	Cassin's Kingbird
Muscivora forficata (Gmelin)	Scissor-tailed Flycatcher
Myiarchus crinitus boreus Bangs	Northern Crested Flycatcher
Myiarchus cinerascens cinerascens (Lawrence)	Ash-throated Flycatcher
Empidonax flaviventris (Baird and Baird)	Yellow-bellied Flycatcher
Empidonax virescens (Vieillot)	Acadian Flycatcher
Empidonax traillii brewsteri Oberholser	Little Flycatcher
Empidonax traillii traillii (Audubon)	Alder Flycatcher
Empidonax minimus (Baird and Baird)	Least Flycatcher
Empidonax hammondii (Xantus)	Hammond's Flycatcher
Empidonax wrighti Baird	Wright's Flycatcher
Contopus pertinax pallidiventris (Chapman)	Coues's Flycatcher
Contopus virens (Linnaeus)	Eastern Wood Pewee
Contopus richardsoni richardsoni (Swainson)	Western Wood Pewee
Nuttallornis borealis (Swainson)	Olive-sided Flycatcher
Tachycineta thalassina lepida Mearns	Violet-green Swallow
Iridoprocne bicolor (Vieillot)	Tree Swallow
Riparia riparia riparia (Linnaeus)	Bank Swallow
Stelgidopteryx ruficollis serripennis (Audubon)	Rough-winged Swallow
Hirundo rustica erythrogaster Boddaert	Barn Swallow

Petrochelidon pyrrhonota melanogaster (Swainson)	Mexican Cliff Swallow
Dumetella carolinensis (Linnaeus)	Catbird
Turdus migratorius propinquus Ridgway	Western Robin
Hylocichla mustelina (Gmelin)	Wood Thrush
Hylocichla guttata polionota Grinnell	Mono Hermit Thrush
Hylocichla guttata auduboni (Baird)	Audubon's Hermit Thrush
Hylocichla ustulata ustulata (Nuttall)	Russet-backed Thrush
Hylocichla ustulata swainsoni (Tschudi)	Olive-backed Thrush
Hylocichla minima minima (Lefresnaye)	Gray-cheeked Thrush
Polioptila caerulea caerulea (Linnaeus)	Blue-gray Gnatcatcher
Regulus calendula calendula (Linnaeus)	Eastern Ruby-crowned Kinglet
Anthus spinoletta rubescens (Tunstall)	American Pipit
Bombycilla cedrorum Vieillot	Cedar Waxwing
Vireo belli belli Audubon	Bell's Vireo
Vireo flavifrons Vieillot	Yellow-throated Vireo
Vireo solitarius solitarius (Wilson)	Blue-headed Vireo
Vireo solitarius cassini Xantus	Cassin's Vireo
Vireo philadelphicus (Cassin)	Philadelphia Vireo
Vireo gilvus gilvus (Vieillot)	Eastern Warbling Vireo
Vireo gilvus swainsoni Baird	Western Warbling Vireo
Mniotilta varia (Linnaeus)	Black and White Warbler
Helmitheros vermivorus (Gmelin)	Worm-eating Warbler
Vermivora chrysoptera (Linnaeus)	Golden-winged Warbler
Vermivora pinus (Linnaeus)	Blue-winged Warbler
Vermivora peregrina (Wilson)	Tennessee Warbler
Vermivora celata lutescens (Ridgway)	Lutescent Warbler
Vermivora ruficapilla ruficapilla (Wilson)	Nashville Warbler
Vermivora ruficapilla ridgwayi van Rossem	Calaveras Warbler
Parula americana pusilla (Wilson)	Northern Parula Warbler
Dendroica petechia aestiva (Gmelin)	Eastern Yellow Warbler
Dendroica petechia rubiginosa (Pallas)	Alaska Yellow Warbler
Dendroica petechia brewsteri Grinnell	California Yellow Warbler
Dendroica petechia sonorana Brewster	Sonora Yellow Warbler
Dendroica magnolia (Wilson)	Magnolia Warbler
Dendroica caerulescens caerulescens (Gmelin)	Black-throated Blue Warbler
Dendroica coronata coronata (Linnaeus)	Myrtle Warbler
Dendroica coronata hooveri McGregor	Alaska Myrtle Warbler
Dendroica auduboni auduboni (Townsend)	Audubon's Warbler
Dendroica auduboni nigrifrons Brewster	Black-fronted Warbler
Dendroica townsendi (J. K. Townsend)	Townsend's Warbler
Dendroica virens virens Gmelin	Black-throated Green Warbler
Dendroica chrysoparia Sclater and Salvin	Golden-cheeked Warbler
Dendroica occidentalis (J. K. Townsend)	Hermit Warbler
Dendroica cerulea (Wilson)	Cerulean Warbler
Dendroica fusca (Müller)	Blackburnian Warbler
Dendroica dominica albilora Ridgway	Sycamore Warbler
Dendroica pensylvanica (Linnaeus)	Chestnut-sided Warbler
Dendroica castanea (Wilson)	Bay-breasted Warbler
Seiurus aurocapillus aurocapillus (Linnaeus)	Oven-bird
Seiurus noveboracensis noveboracensis (Gmelin)	Northern Water-Thrush
Seiurus noveboracensis notabilis Ridgway	Grinnell's Water-Thrush
Seiurus motacilla (Vieillot)	Louisiana Water-Thrush
Oporornis formosus (Wilson)	Kentucky Warbler
Oporornis philadelphia (Wilson)	Mourning Warbler
Oporornis tolmiei (Townsend)	Macgillivray's Warbler
Geothlypis trichas brachidactyla (Swainson)	Northern Yellow-throat
Geothlypis trichas occidentalis Brewster	Western Yellow-throat
Icteria virens virens (Linnaeus)	Yellow-breasted Chat
Wilsonia citrina (Boddaert)	Hooded Warbler
Wilsonia pusilla pusilla (Wilson)	Wilson's Warbler
Wilsonia pusilla pileolata (Pallas)	Northern Pileolated Warbler
Wilsonia pusilla chryseola Ridgway	Golden Pileolated Warbler
Wilsonia canadensis (Linnaeus)	Canada Warbler
Setophaga ruticilla (Linnaeus)	American Redstart

Icterus spurius (Linnaeus)	Orchard Oriole
Icterus galbula (Linnaeus)	Baltimore Oriole
Icterus bullockii bullockii (Swainson)	Bullock's Oriole
Euphagus cyanocephalus (Wagler)	Brewer's Blackbird
Piranga ludoviciana (Wilson)	Western Tanager
Piranga olivacea (Gmelin)	Scarlet Tanager
Piranga rubra rubra (Linnaeus)	Summer Tanager
Pheuticus ludovicianus (Linnaeus)	Rose-breasted Grosbeak
Guiraca caerulea caerulea (Linnaeus)	Eastern Blue Grosbeak
Guiraca caerulea interfusa Dwight and Griscom	Western Blue Grosbeak
Passerina cyanea (Linnaeus)	Indigo Bunting
Passerina ciris ciris (Linnaeus)	Eastern Painted Bunting
Spiza americana (Gmelin)	Dickcissel
Passerculus sandwichensis anthinus Bonaparte	Western Savannah Saprrow
Ammodramus savannarum pratensis (Vieillot)	Eastern Grasshopper Sparrow
Ammodramus savannarum perpallidus (Coues)	Western Grasshopper Sparrow
Pooecetes gramineus confinis Baird	Western Vesper Sparrow
Chondestes grammacus strigatus Swainson	Western Lark Sparrow
Melospiza lincolni lincolni (Audubon)	Lincoln's Sparrow

Birds Which Occur in
Both Guatemala and the United States as Breeders,
And Which Are More or Less Migratory

Colymbus dominicus brachypterus Chapman	Mexican Grebe
Pelecanus occidentalis carolinensis Gmelin	Eastern Brown Pelican
Casmerodius albus egretta (Gmelin)	American Egret
Leucophoyx thula thula (Molina)	Snowy Egret
Hydranassa tricolor ruficollis (Gosse)	Louisiana Heron
Florida caerulea caerulea (Linnaeus)	Little Blue Heron
Ixobrychus exilis exilis (Gmelin)	Eastern Least Bittern
Ixobrychus exilis hesperis Dickey and van Rossem	Western Least Bittern
Mycteria americana Linnaeus	Wood Ibis
Guara alba (Linnaeus)	White Ibis
Ajaia ajaja (Linnaeus)	Roseate Spoonbill
Dendrocygna autumnalis lucida Friedmann	Black-bellied Tree Duck
Porphyrula martinica (Linnaeus)	Purple Gallinule
Gallinula chloropus cachinnans Bangs	Florida Gallinule
Fulica americana americana Gmelin	American Coot
Columba fasciata fasciata Say	Band-tailed Pigeon
Columba flavirostris flavirostris Wagler	Red-billed Pigeon
Zenaida asiatica asiatica (Linnaeus)	Eastern White-winged Dove
Zenaida asiatica mearnsi (Ridgway)	Western White-winged Dove
Myiarchus tyrannulus nelsoni Ridgway	Mexican Crested Flycatcher
Camptostoma imberbe imberbe Sclater	Beardless Flycatcher
Progne chalybea chalybea (Gmelin)	Gray-breasted Martin
Corvus corax sinuatus Wagler	American Raven
Cassidix mexicanus mexicanus (Gmelin)	Great-tailed Grackle

Birds Which Occur in Both Guatemala
And the United States as Breeders,
But Which are Relatively Sedentary

Phalacrocorax olivaceus mexicanus (Brandt)	Mexican Cormorant
Anhinga anhinga leucogaster (Vieillot)	Anhinga, Water Turkey
Coragyps atratus (Meyer)	Black Vulture
Buteo albonotatus Kaup	Zone-tailed Hawk
Buteo brachyurus Vieillot	Short-tailed Hawk
Parabuteo unicinctus harrisi (Audubon)	Harris's Hawk
Buteogallus anthracinus anthracinus (Lichtenstein)	Mexican Black Hawk

Polyborus cheriway auduboni (Cassin)	Audubon's Caracara
Columbigallina passerina pallescens (Baird)	Mexican Ground Dove
Scardafella inca (Lesson)	Inca Dove
Crotophaga sulcirostris sulcirostris Swainson	Groove-billed Ani
Otus flammeolus flammeolus (Kaup)	Flammulated Screech Owl
Glaucidium brasilianum cactorum van Rossem	Ferruginous Pygmy Owl
Loxia curvirostra stricklandi Ridgway	Mexican Crossbill

Some Banded Birds Recovered in Guatemala

Great Blue Heron, 36-715848, immature, banded 6/27/37 at Depue, Illinois, by Karl E. Bartel, was reported as having "arrived a few days ago" at Coatepeque, Quezaltenango, in letter dated 3/27/45 from Augusto Barrios S., Jefe de la Oficina, Secretaria de Agricultura, Guatemala.

Black-crowned Night Heron, 38-707141, banded 7/6/39 at Sand Lake Refuge, Columbia, South Dakota, by Watson E. Beed, was reported in letter of 4/11/44 by Ernesto Rivas, Secretaria de la Presidencia de la Republica de Guatemala. This heron had been killed about 3/10/44 at a place called Patalpin, on the Bay of Atitlán, by Gregorio Quievac Yataz, who lives in Atitlán.

Black-crowned Night Heron, A 609658, juvenile, banded 6/26/31 at Rush Lake Island, Webster, South Dakota, by A. R. Lundquist, was killed about 10/26/32 at Sepacuité, and reported by Robert Burkitt, Sepacuité, Panzós.

Pintail, 140-610925, juvenile, banded 7/8/44 at Louisiana Lake, Tilley, Alberta, by T. E. Randall for B. W. Cartwright, was recovered 2/27/45 at Lake Palencia, 7 km. from Guatemala City, by an Indian hunter, Seriaco Lopez G., who reported it to the American Embassy.

Pintail, 38-658609, adult male, banded 8/3/38 at Sand Lake Refuge, Columbia, South Dakota, by Philip A. DuMont, was shot in the fall of 1939 at Jutiapa, and reported by F. S. Figueroa, Finca Vista Hermosa Progreso, Jutiapa.

Pintail, 40-676154, female, banded 9/11/40 at Big Lake, Athabaska Delta, Alberta, by B. W. Cartwright, was taken 1/20/41 at Jalapa, by Buenaventura Morales, Ciudad de Jalapa.

Pintail, 36-674007, adult female, banded 10/10/36 at Upper Souris Refuge, Foxholm, North Dakota, by Philip N. Chase, was killed in March 1937 at Guatemala City, by Francisco Sagastume, Villa Engelino, Guatemala City.

Herring Gull, 38-677106, banded 6/17/40 on Four Brothers Island, Lake Champlain, Vermont, by H. F. Perkins, was caught prior to 4/21/41 in the vicinity of Tahuexco, Suchitepéquez (91° 36' 50" W, 14° 05' 10" N), and reported to the American Minister by the Secretary to President Ubico.

Herring Gull, 38-677279, banded 6/17/40 at Four Brothers Island, Lake Champlain, Vermont, by H. F. Perkins, was reported in letter of 5/6/41 by Gonzalo Catalán, San José de Guatemala.

Herring Gull, 39-640084, immature, banded 6/26/39 at Pizmire Island, Lake Michigan, Michigan, by F. E. Ludwig, was "found" 2/18/40 by J. Manuel Morales B., and reported by Alfonso Arís of Livingston.

Herring Gull, 36-664207, banded 6/27/37 at Hat Island, Wisconsin, by Harold C. Wilson, was found injured (later died) 5/2/38 at San Marcos, by Gen. M. Ydigoras Fuentes of San Marcos, Guatemala.

Herring Gull, 36-663950, immature, banded 6/27/37 at Hat Island, Wisconsin, by Harold C. Wilson, was shot about 12/30/37 at Tiquisate in the southern part of Guatemala, by Edmund A. Osborne, 3a Avenida Norte No. 20, Guatemala City.

Herring Gull, 36-663811, immature, banded 6/27/37 at Hat Island, Wisconsin, by Harold C. Wilson, was killed 1/1/38 at Tiquisate, by Alejandro Córdova, Director de El Imparcial, Guatemala City.

Herring Gull, 37-607355, banded 6/28/37 at Western Islands, Georgian Bay, Ontario, by Lawrence Tyler, was shot 12/5/37 at Puerto Barrios by Mr. Ramulfo Solano, Chief of the Custom Police in that port, and reported by Emilio Ubico, Collector of Customs at the same address.

Herring Gull, 34-660765, immature, banded 6/28/36 at Sugar Isle, Lake Huron, Michigan, by F. E. and C. C. Ludwig, was recovered 1/21/37 at Puerto Barrios, by Cristobal Melo T.

Laughing Gull, 41-507234, juvenine, banded 7/28/41 at Cobb Island, Virginia, by Herbert Buckalew, was captured by a fisherman 1/28/42 at San José de Guatemala, and reported by Mr. L. A. Summerhayes, San José de Guatemala.

Laughing Gull, A 528858, juvenile, banded 7/2/31 at Cobb Island, Virginia, by Herbert Buckalew, was killed about 2/3/32 by the President of Guatemala, and reported by Sheldon Whitehouse, American Minister.

Franklin's Gull, 38-426770, juvenile, banded 7/24/39 at Sand Lake National Wildlife Refuge, Columbia, South Dakota, by Watson E. Beed, was "probably found dead" in March 1940 on the Chiquimulilla Canal on the Pacific Coast, by Mariano Pacheco H., Dirección General de Agricultura, Guatemala City.

Franklin's Gull, 38-537758, juvenile, banded 7/12/38 at Sand Lake National Wildlife Refuge, Columbia, South Dakota, by P. A. DuMont, was caught on a fish hook 12/11/38 at San José de Guatemala, and reported by W. J. Hunter (complete address not available).

Franklin's Gull, 37-514389, banded 6/25/37 at Sand Lake National Wildlife Refuge, Columbia, South Dakota, by P. A. DuMont, was caught on a fish line 2/1/38 at Champerico, by Max. Morales, c/o Compañía Holandesa, Guatemala City.

Mourning Dove, 34-407585, juvenile, banded 6/2/38 at Higginsville, Missouri, by Irvin Sturgis, was shot about 12/7/40, by Guillermo Chamorro E., Avenida Minerva, Quezaltenango.

7 Indigo Buntings, banded from April 1 to April 15, 1931, at Uaxactún, Petén, Guatemala, by Josselyn Van Tyne, were subsequently retrapped at the same place by A. Ledyard Smith at Carnegie Institute. 6 of these were taken from April 6 to April 9, 1932; the other was trapped April 16, 1933.

Laughing Gull, 42-533157, juvenile, banded 7/19/45 at Cobb Island, Virginia, by Herbert Buckalew, was caught on a fish line 11/26/45, at San Jose de Guatemala, and reported by Leonard A. Summerhayes, San Jose de Guatemala. Mr. Summerhayes has banded 21 Blue-winged Teal and 1 Shoveller with our bands, but no recoveries have been reported.

Eastern White-winged Dove, No. 36409, juvenile, banded August 20, 1941, near Rio Hondo, Cameron County, Texas, was recovered, fed, and liberated by Sr. Carlos Castaneda, Secretaria de la Presidencia, Republica de Guatemala, at Cuajinicuilapa, Dept. of Santa Rosa, on or about November 11, 1941. This bird was banded by E. C. Marsh.

Several other White-winged Doves banded in Texas were reported from El Salvador, so they must have traversed Guatemala enroute.

Administration of the Department of Fish and Game

No detailed discussion of this subject will be included in this report. It is recommended that the following publication be used as a guide in the administration of the Department, insofar as the recommendations can be applied satisfactorily to Guatemalan conditions: "Suggestions for Model State Game and Fish Administration---" adopted at the 28th Annual Convention of the International Association of Game, Fish, and Conservation Commissioners, 1934. This publication can be obtained from the Wildlife Management Institute, Investment Building, Washington, D. C.

Game Regulations

The game and hunting regulations proposed to the Ministry of Agriculture by the appointed Committee on Fish and Game have been reviewed, and, in general, are recommended. Detailed suggestions regarding some of the regulations needed to protect the fauna of the Republic are as follows:

Mammals.--The hunting of deer should be permitted only during the day. In the Departments of the Republic in which deer (Odocoileus) and brocket (Mazama, called quitzicil) occur, the time and length of the hunting season should be based on existing conditions.

In general, the season should be limited to the months from November 1 through March 31.

In the Departments in which their numbers are too few, the season should be closed.

In all Departments, the season should be closed during the principal period when these deer are breeding.

Any person who buys deer hides for commercial use should be required to have a license from the Government. Every transaction should be recorded with the Department of Fish and Game, as that office should have a record of all deer hides purchased. Permits should also be required for the exportation of these hides, and records kept of the number exported. Part of any fees charged for these permits should revert to the Department of Fish and Game to finance its operations.

The hunting of the following animals should be prohibited: tapir (danta), manatee (manati), monkeys, and ant-eaters (oso colmenera and oso real).

Birds.--The hunting season on quails, partridges, tinamous, pajuiles (Crax), pavas (Penelope), chachas (Ortalis), doves, pigeons, and other game birds except ducks should be limited to the period from September 1 to March 1. During the remainder of the year, most of these birds are breeding.

In the Departments in which any of these game birds have been very greatly reduced in numbers and their extermination is threatened, the season should be closed.

The hunting season on ducks should be from October 1 to January 31; only four months in length. By February 1, resident ducks are beginning to nest and the migrants are enroute to their breeding grounds.

The shooting of ducks with rifles of any and all types should be prohibited. Only the following should be considered game birds: tinamous, ducks, geese, curassows (pajuiles), guans (Penelope, called pavas), chachas (Ortalis and Penelopina), horned guans (Oreophasis), partridges (Dendrortyx and Dactylortyx), quails (Colinus and Cyrtonyx), ocellated or Petén turkey (Agriocharis), rails (Rallus, Amaurolimnas, Aramides, Porzana, and Laterallus), gallinules (Gallinula and Porphyrula), coots (Fulica), thick-knees or alcaravanes (Burhinus), the large doves and pigeons.

The hunting of Alcaravanes or thick-knees (Burhinus) should be prohibited, because of their scarcity.

Of the many kinds of doves and pigeons, the hunting of the small species known as tortolas or totolitas should be prohibited.

The hunting of shorebirds, including snipe (becacinas), plover (gangas), and other species should be prohibited because of their relative scarcity.

The hunting of herons and egrets (garzas), storks and ibises (garzones and sarjentos), and other species that are considered valuable as ornamental birds should be prohibited.

Many hunters have recommended that the hunting of ocellated turkeys (pavos del Petén) be prohibited. We have no first-hand information on this subject, but the Department of Fish and Game should consider this need.

The hunting of birds should be prohibited at those parts of Lake Atitlán and Lake Amatitlán near villages, and on the Chiquimulilla Canal.

Commercial sale of any and all game birds should be prohibited throughout the year. The taking of game birds by means of traps or snares should be prohibited throughout the year.

All song birds and insectivorous birds should be given full protection. Some of the families to be included in this protection are listed in the recommended treaty for protection of migratory birds.

Itinerary of Wildlife Survey

February 28 — May 12, 1946

February	
28	Guatemala City to Antigua, Sacatepequez.
March	
1	Antigua, Sacatepequez, to Chimaltenango, Chimaltenango.
2	Chimaltenango to Guatemala City.
25	Guatemala City to Escuintla, Escuintla.
26	Escuintla, Escuintla, to Cerritos, Santa Rosa.
27-28	Cerritos, Santa Rosa.
29	Cerritos, Santa Rosa, to Guatemala City.
April	
8	Guatemala City to Tiquisate and Zunil, Suchitepequez.
9-13	Zunil, Suchitepequez.
14	Zunil to Tiquisate, Suchitepequez, to Guatemala City.
25	Guatemala City to Lake Atescatempa, Jutiapa.
26	Lake Atescatempa, Jutiapa
27	Lake Atescatempa, Jutiapa, to Guatemala City.
May	
1	Guatemala City to Panajachel, Sololá.
2	Panajachel to San Lucas Tolimán, Sololá.
3	San Lucas Tolimán, Sololá, to Patzún, Chimaltenango.
4	Patzún, Chimaltenango, to Guatemala City.
12	Guatemala City to San Juan Sacatepequez, Guatemala, and return.

March 14 — June 1, 1947

March	
14	Guatemala City to Lake Amatitlán, Guatemala.
15	Lake Amatitlán, Guatemala.
16	Lake Amatitlán, Guatemala, to Guatemala City.
19	Guatemala City to Masagua, Escuintla.
20	Masagua to Los Arcos, Escuintla.
21	Los Arcos, Escuintla.
22	Los Arcos to San Victor, Escuintla.
23	San Victor, Escuintla.
24	Finca Valle-Lirios, Escuintla.
25	Finca Valle-Lirios, Escuintla
26	Finca Valle-Lirios, Escuintla, to Guatemala City.
31	Guatemala City to San José, Escuintla.

April

1-6	San José, Escuintla.
7	San José to Guatemala City.
8	Guatemala City to Chocolá, Suchitepequez.
9	Chocolá, Suchitepequez.
10-13	Finca Helvetia, Quetzaltenango.
14	Finca Helvetia, Quetzaltenango, to Guatemala City.
17	Guatemala City to Lake Atescatempa, Jutiapa.
18-19	Lake Atescatempa, Jutiapa.
20	Lake Atescatempa, Jutiapa, to Guatemala City.
22	Guatemala to El Quiché.
23	San Pedro Jocopila, El Quiché.
24	Sacapulas, El Quiché.
25-27	Nebaj, El Quiché.
28	Chajul, El Quiché.
29	Cotzal, El Quiché.
30	Nebaj, El Quiché, to Chemal, Huehuetenango.

May

1	Chemal, Huehuetenango.
2	Chemal, Huehuetenango, to Santa Ana Malacatán, Huehuetenango.
3	Santa Ana Malacatán, Huehuetenango, to Guatemala City.
6	Guatemala City to Trujillo, Zacapa
7	Trujillo, Zacapa.
8	Cabavnas, Zacapa
9	El Progreso to Guatemala City.
14	Guatemala City to Salamá, Baja Vera Paz.
15	Salamá, Baja Vera Paz, to Panzós, Alta Vera Paz.
16-17	Panzós, Alta Vera Paz.
18	Panzós, Alta Vera Paz, to Tamahú, Alta Vera Paz.
19	Tamahú, Alta Vera Paz, to El Chol, Baja Vera Paz.
20	El Chol, Baja Vera Paz, to Guatemala City.
21	Guatemala City to Mataquescuintla, Jalapa.
22	Mataquescuintla, Jalapa, to San José Pinula, Guatemala.
23	San José Pinula to Guatemala City.
31	Guatemala City to Patzún, Chimaltenango.

June

1	Patzún, Chimaltenango, to Guatemala City.

Notes on the Game Birds and Shorebirds of Guatemala

In the following annotated list of the game birds and shorebirds of Guatemala, many data have been taken from publications, in which case the source of the information is indicated. See the section on "Bibliography" for the listing of these other sources of information.

The scientific names used are, with few exceptions, those given by Peters (1931-1937). With those birds which occur in the United States as well as in Guatemala, the last edition (Fourth, 1931) of the Check-List of North American Birds, published by the American Ornithologists' Union, and its five supplements, have been followed in general.

The measurements given are mostly from Ridgway (1916-1919), and Ridgway and Friedmann (1941-1946), and are in millimeters. The weights are in grams unless otherwise stated. Measurements and weights of ducks are chiefly from Kortright (1942).

References to Griscom pertain to his 1932 publication unless otherwise specified. Many of the statements regarding distribution in Guatemala are based partly on that publication.

All bird specimens obtained during this survey are in the collection of the Fish and Wildlife Service, United States National Museum.

Notes on the Game Birds and Shorebirds of Guatemala

1. *Tinamus major robustus* Sclater and Salvin

Robust Tinamou

Other Names.--
Guatemalan: cholola, colola, Juan golola, gololo, perdiz grande, perdiz de la montaña
English: partridge, bush hen

Status.--Reported to be a common resident of the dense tropical forests, especially those with more open ground cover. The distribution and abundance of this tinamou are affected primarily by the changes in its native forest; clearing or selective cutting forces its retreat to the remaining heavy woodland. In virgin areas hunting apparently has little effect on the numbers of this species.

Description.--A large tinamou, the size of a small guinea hen, general coloration brown above, somewhat barred on the back and wings, paler and grayer below. It is plump-bodied, full breasted, and has a very short tail, slender neck, and small head.

Adults.--Head and upper neck blackish, some worn specimens showing reddish subterminal markings; rest of upperparts brown, irregularly barred with black on the back, primary coverts, secondaries, and tail coverts; the longest tail coverts finely spotted or variegated with dark buff and black; chin and throat white; sides of head and neck all around barred with black and light cinnamon giving a very mottled or spotted appearance, especially in worn examples; lower parts olive gray, posteriorly barred indistinctly with brown; the flanks heavily barred with brownish black and buff; the undertail coverts cinnamon buff to cinnamon rufous, streaked and mottled with dark brown.

Measurements.--
Male (1)
Wing, 237
Tail, 88
Culmen from cere, 16.1
Tarsus, 69

General Distribution.--Southeastern México, south in the Caribbean lowlands to Honduras, and in the highlands to northern Nicaragua.

Distribution in Guatemala.--Humid Tropical Zone of the Caribbean drainage, chiefly rain forests. It is believed that the distribution of this subspecies extends northward to include the southern part of Petén.

Records.--"Alta Vera Paz, Panzós, 16 May 1947. One was heard calling in late afternoon. Natives say it is common in the forest. A half-grown bird is in captivity at Cahaboncillo. 17 May, one was seen on trail beside the Río Cahabón in thick jungle . . ." (Handley) Izabal, near Bananera: Mr. Greenberg of the Compañía Agrícola de Guatemala, reported that he and other employees of the company shot these large tinamous in the jungle and on the fincas near Bananera.

Dennis Koester of the Finca Seamay reported it to be common in the woodlands near Panzós and Senahú.

Near Cotzal, in the Department of Quiché: It was said to be common in the dense forest east and north of the Finca San Francisco by George Brol, one of the owners, who is an experienced hunter.

Although to date no specimens have been taken on the Pacific slope, the following references may pertain to this tinamou. At Ixtán, near Champerico, Percy Davies, manager of the Finca Helvetia and of the salt works near Ixtán, reported seeing large speckled guinea-like birds cross woodland roads ahead of his car in that vicinity. These may have been of this species as his description was of birds larger than Crypturellus. Griscom mentioned "that Anthony writes that he feels convinced he flushed one in the rain forest near Finca El Espino." This finca is fifteen miles south of Mazatenango.

In literature: Choctum, Yzabal, Sierra de las Minas, probably on the northern slope (Salvin and Godman); Yzabal, eggs (Salvin); Santo Tomás (Lantz).

Habits and Hunting.--"Preeminently a species of dark, heavy rain forest, of shy and retiring habits, and disappearing when these conditions are destroyed. It is consequently unrecorded from the Pacific slope of Central America north of western Costa Rica, but might be expected to occur in northwestern Guatemala. Indeed, Anthony (MS) writes that he feels convinced he flushed one in the rain forest near Finca El Espino. Throughout Central America it is assiduously hunted for food, and is unquestionably decreasing near settled districts. As is now well known, it is easily domesticated and becomes quite a pet." (Griscom.) It is reported that in areas where banana plantations are adjacent to the dense lowland forests, this bird is occasionally observed walking around in the low, lush, ground vegetation beneath the banana plants.

This tinamou apparently occurs chiefly in the dense, dark tropical forest, and is usually solitary in habit. Like the others of its family, it is shy, wary, and is usually encountered under conditions which make shooting it very difficult.

Its calls are flute-like, whistled notes, more frequently heard in the late afternoon and at dusk.

Information from natives and other residents indicated that they nest during the period February to June, the four or five eggs being laid on the ground, usually at the base of a shrub or tree. They are larger than those of a domestic hen, more round, very glossy, and blue-green in color. This large, plump-breasted species provides good sport for the hunter who enjoys stalking his game. Because of its wariness and the density of the cover, the average shooter will obtain few birds during a day's hunt. It is reported that the most successful method of hunting is to locate them by their whistled notes, then decoy them within range by imitating their calls. Dogs were said to have been used with only fair success.

2. Tinamus major percautus Van Tyne

Petén Tinamou

Other Names.--
Guatemalan: perdiz grande, Juan golola, I x mancolol (Maya)
English: partridge, big tinamou

Status.--Resident, reported to be fairly common in the dense forests of El Petén.

Description.--In general appearance similar to the preceding subspecies, but paler on the underparts.

"Like Tinamus major robustus Sclater and Salvin but much grayer above, especially on the neck and upper back. Paler below. White of throat more extensive. Breast much paler, and belly practically white in extreme examples. Crissum paler, less rufous. As T. m. robustus was the palest and greyest of all of the previously known Central American forms of the species, the new subspecies here described need not be compared with the other still darker subspecies of the southeast." (Van Tyne, 1935:8.) Eyes brown, upper mandibls dark sepia, lower mandible paler, feet and legs bluish ash or leaden.

Measurements.--

Male (8)	Female (4)
Wing, 210-235 (228.3)	Wing, 225-247 (235.5)
Tail, 84-105 (94.4)	Tail, 91-103 (94.3)
Tarsus, 69.1-74 (71.1)	Tarsus, 71.1-74.2 (72.3)
Culmen from base (4), 35-38 (36.5)	Culmen from base (2) 39-40 (39.5)
Culmen from cere (4), 15.1-16.9 (15.8)	Culmen from cere, 15.2-17.3 (16.3)

(Above data from Van Tyne, letter)

Weight.--

Male (4), 875-1093 (982.2) Female (3), 1106-1136 (1121.3)

(Van Tyne, 1935:9)

General Distribution.--El Petén, Guatemala.

Distribution in Guatemala.--Tropical Zone, presumably in the drier forests of central and northern Petén.

Records.--This tinamou was not observed during our reconnaissance. In literature it has been recorded from: Uaxactún, Petén; and a set of eggs was collected by Malleis near Sacchich on the way to Chuntuqui (Van Tyne).

Habits and Hunting.--See the preceding subspecies.

3. Crypturellus soui meserythrus (P. L. Sclater)

Mexican Pileated Tinamou

Other Names.--
Guatemalan: perdiz, gallina del monte
English: bush partridge, tinamou

Status.--This tinamou is reported to be a fairly common resident within its range.

Description.--The smallest of the tinamous of the Republic, not much larger than a quail. In coloration, the underparts are light cinnamon brown, upperparts dark cinnamon brown, both unbarred.

Adult male.--Top and sides of head slate color to blackish slate; rest of upper surface bright brown becoming more rufous on the tail feathers and coverts (the tail feathers are well concealed by the relatively long coverts); chin and throat white, shading into dark olive brown on the jugulum; breast light cinnamon rufous; the abdomen light cinnamon buff; under tail coverts light cinnamon buff mottled with rufous brown.

Adult female.--Similar to the adult male but more reddish, especially on the wing coverts and the tail coverts, although most outstanding on the underparts.

Measurements.--

Male (5)	Female (6)
Wing, 120-132 (125)	Wing, 120-130 (126.5)
Tail, 33-40 (37)	Tail, 35-41 (37.1)
Tarsus, 37-40 (38.2)	Tarsus, 36-39 (37.7)
Culmen from cere, 10.2-11.9 (10.9)	Culmen from cere, 10.8-13 (11.6)

General Distribution.--Southern México to Honduras.

Distribution in Guatemala.--Tropical Zone, Caribbean lowland forests, ranging from sea-level up to at least 1600 feet.

Records.--Quiché, Cotzal. This tinamou was reported by George Brol to occur near Finca San Francisco.

Yzabal, Bananera. It was reported by employees of the Compañía Agrícola de Guatemala to be fairly common in brushy woodlands of the Motagua Valley below Bananera and near Quiriguá.

In literature: Choctum and Chisec (Salvadori); Los Amates (Dearborn); Secanquim, Chipoc, Finca Chamá (Griscom); Chuntuquí, Sacchich, Remate (Van Tyne); Cobán, Sacapulas, Chemulco.

Habits and Hunting.--It is reported to prefer thickets and brushy margins of the forests, rather than the heavy, dark forest itself.

Little information is available regarding this species. Carriker, in Costa Rica, reported that "A single nest of this species was taken at Boruca, August 9, 1907, containing two slightly incubated eggs. The nest was made on the ground at the foot of a shrub in a tract of second-growth woodland."

4. Crypturellus boucardi boucardi (P. L. Sclater)

Boucard's Tinamou

Other Names.--
Guatemalan: perdiz de montaña, perdiz, balih (Maya)
English: partridge

Status.--Boucard's tinamou is reported to be a fairly common resident within its range.

Description.--About the same size as C. cinnamomeus but much darker; upperparts very dark brown; neck and breast dark gray, abdomen brown, more or less barred.

Adult male.--Head, neck, and upper breast blackish slate shading into slate color on the hind neck and upper back; rest of upper surface dark brown with indistinct wavy blackish bars; wing coverts and secondaries edged with cinnamon brown; chin greyish white shading to light drab on the throat and jugulum; belly, upper abdomen, and sides hair brown, the latter edged or tipped with dark cinnamon buff; the feathers of the lower abdomen broadly tipped with buffy white to cinnamon buff and with a subterminal bar of dark brown or black; the flanks also with a subterminal wavy spot or bar of black and tipped with cinnamon buff; under tail coverts barred and mottled with cinnamon buff and dark brown; legs red.

Adult female.--Similar to the adult male but upper surface more rufous and barred broadly with black and narrowly with cinnamon buff, especially on the wing and tail coverts and secondaries; underparts more cinnamomeus with more pronounced barring on the sides, flanks, and abdomen.

Measurements.--

Male (10)	Female (10)
Wing, 156-169 (160.9)	Wing, 158-165 (161.7)
Tail, 42-50 (46.7)	Tail, 43-52 (47.4)
Tarsus, 48-53 (50.9)	Tarsus, 50-53 (51.5)
Culmen from cere, 14.4-16.1 (15.4)	Culmen from cere, 15.2-16.7 (16.1)

General Distribution.--Southern México, south in the highlands to northern Nicaragua.

Distribution in Guatemala.--Tropical Zone, rain forests of the Caribbean slope, ranging from sea-level up to at least 1600 feet.

Records.--Quiché, Cotzal: George Brol described this species as occurring in the heavy forest near Finca San Francisco.

Quetzaltenango, Finca Helvetia, April 10, 1947: A tinamou, which may have been of this species, was heard calling in the cloud forest at about 5500 feet elevation. It was decoyed within a few yards by whistled imitations of its notes, but because of the dense undergrowth and poor visibility was never seen.

In literature: Choctum, Chisec (Salvin and Godman); Secanquim (Griscom); Uaxactún (Van Tyne); Chisec (Griscom, Ibis, 1935:543).

Habits and Hunting.--See the following species.

Boucard's tinamou differs from cinnamomeus in occupying the heavier, more humid forests; consequently it is more difficult to shoot.

5. Crypturellus cinnamomeus cinnamomeus (Lesson)

Cinnamomeus Tinamou

Other Names.--

Guatemalan: perdiz, gallina del monte
English: partridge, tinamou

Status.--Lesson's tinamou is reported to be a common resident within its range.

Description.--Similar to a very small guinea hen in build; breast and belly cinnamon brown, back dark brown finely barred with black; wing coverts dark brown barred with buff.

Adult male.--Top of head finely barred with black, back of head and neck light auburn blending on the back to cinnamon brown, finely barred with blackish brown; rump, upper tail coverts and secondaries paler but more distinctly barred; tail feathers with narrow bars of pale cinnamon buff and broader bars of black; lesser wing coverts like upper back but remainder with narrow light buff and broad black stripes; chin and throat white; superciliary stripe cinnamon rufous; jugulum amber shading into cinnamon rufous on the chest and light cinnamon buff on the abdomen; sides and flanks barred with black and cinnamon buff, and tipped with light buff; under tail coverts barred and mottled like the flanks but broadly tipped; iris tawny olive, legs red.

Adult female.--Similar to the adult male but some specimens with breast barred.

Measurements.--See C. c. soconuscensis. No data for this subspecies.

General Distribution.--Southeastern El Salvador, north and west in the Valley of the Lempa River.

Distribution in Guatemala.--Arid Tropical Zone; is believed to occur in the Pacific coastal woodland of the extreme southeastern part of the Republic.

Records.--None, as yet, for the Republic. It is recorded from localities in Salvador, and may occur in the Department of Jutiapa and perhaps farther west.

Habits and Hunting.--Of the subspecies cinnamomeus in El Salvador, Dickey and Van Rossem wrote, "These small tinamous are better and more generally known than any other native game birds for, although nowhere abundant, they are distributed throughout the Arid Lower Tropical Zone, and one or more birds are almost sure to be encountered during a morning's walk in wooded or semiwooded country. A favorite habitat is well-grown, second growth woods along the lower foothills, in places where the foliage of the forest crown is not too dense to permit a fairly thick undergrowth with the resulting leaf mulch. In such a place during the dry season, by walking quietly along an old woods road or trail one can often encounter an occasional tinamou in the act of working over the litter of dead leaves and mold. Unless surprised too suddenly, it will attempt to steal away when the soft rustling of dead leaves enables one quickly to locate it. With the first rains the ground cover becomes a soggy mass which gives forth little or no sound, and tinamou hunting then becomes a very uncertain game. In the wet season, one's introduction to these birds is likely to be a feathered explosion which bursts with a roar from under foot, affording a brief glimpse of a brownish rocket that disappears behind the nearest foliage.

"The laying season in El Salvador extends, judging from the dissection of females, from early April to early August, with the peak of production probably about halfway between these dates. Half-grown young were collected or seen several times in mid-August. They were solitary even at this early age. The young reach their full growth very slowly and are several months old before attaining their maximum weight."

No nests were found during our survey, nor does Griscom (1932) report any nesting data for this species. Dickey and van Rossem (1938) wrote that in El Salvador "The natives say that the nests are on the ground and that four or five eggs are laid. A female taken on Los Esemiles, February 24, contained an egg which had just entered the oviduct, but which was not sufficiently developed to show any shell characters. A female taken on Volcan de San Miguel, March 21, had finished the incubation period . . .

"A broken-up nest together with the remains of the brooding parent was found at Lake Olomega on August 1, 1925. The scratched-out hollow was under a pile of cut brush thrown carelessly in a well-traveled trail, and on several previous days we had jumped over the pile without flushing the brooding bird or being aware of the hidden nest. On the morning in question the numerous scattered feathers which focused in the brush heap quickly disclosed the site. In the hollow were the remains of several eggs, apparently four or five, with shells a highly glossed light purplish red. Whether the feathers of the brooding bird had belonged to a male or a female could not be determined." (Dickey and van Rossem.)

The methods of hunting this tinamou are similar to those for the other species. Its more open habitat gives the hunter better opportunities for shots than are usually afforded by tinamous of the rain forests.

6. Crypturellus cinnamomeus goldmani (Nelson)

Goldman's Tinamou

Other Names.--
Guatemalan: perdiz, gallina del monte
English: partridge

Status.--Goldman's tinamou is reported to be a fairly common resident within its range.

Description.--"Nearest to the nominate race (cinnamomeus), but much paler throughout, especially above and on the chest. The females are well distinguished from those of the allied races by the sharp contrast between the dark reddish pectoral areas and the very light (buffy white) posterior under parts." (Hellmayr and Conover, 1942:68.)

Measurements.--

Male (3)	Female (10)
Wing, 148-156 (151.3)	Wing, 149-163 (155.2)
Tail, 47-49 (48)	Tail, 45-52 (47.7)
Tarsus, 44-46 (45.2)	Tarsus, 45-49 (47.8)
Culmen from cere, 15.3-16.1 (15.8)	Culmen from cere, 15.3-18.9 (16.9)

General Distribution.--Yucatán Peninsula.

Distribution in Guatemala.--Tropical Zone, presumably in the drier forests of the Petén.

Records.--This species was not observed during the survey.
In literature it has been recorded from Uaxactún and Chuntuquí (Van Tyne).

Habits and Hunting.-- Similar to those of the subspecies cinnamomeus.

7. Crypturellus cinnamomeus soconuscensis Brodkorb

Chiapan Tinamou

Other Names.--
Guatemalan: perdiz, gallina del monte
English: partridge

Status.--This tinamou is a very common resident locally in the second growth and gallery forests of the Pacific coastal plain; less common in the lower piedmont.

Description.--In general appearance similar to C. c. cinnamomeus, but averaging darker, especially on the foreneck and chest.

"Differs from true cinnamomeus from Salvador in being somewhat larger and much more deeply colored throughout: pileum blacker; hind neck deeper rufous; upper back more dusky rufous, less bright and pale; lower back and rump with blackish wavy bars much narrower, and with the interfasciate area darker brown; upper tail coverts with the light bars much deeper and more reddish ochraceous; tail also deeper rufous; light markings on wings and upper wing coverts much darker and more rufous ochraceous; superciliary stripe, sides of head and sides of neck deeper chestnut; breast deeper cinnamon, especially laterally; entire posterior under parts, including crissum and thighs, with the light areas pale cinnamon instead of buffy." (Brodkorb, 1939:2.)

Measurements.--

Male (3)	Female (2)
Wing, 155-160 (157.7)	Wing, 159-160
Tail, 45-52 (48.3)	Tail, 53-60
Tarsus, 48-50 (48.7)	Tarsus, 47-48.5
Culmen from cere, 14.4-16.3 (15.6)	Culmen from cere, 16-17.2

General Distribution.--The Arid Tropical Zone, coastal forests of Chiapas and Guatemala.

Distribution in Guatemala.--Arid Tropical Zone, in the drier forests and brushlands of the Pacific slope, from the Chiapas border, at least as far east as San José and Esquintla, and probably into southwestern El Salvador.

Records.--San José, April 1-6, 1947; Tiquisate, April 10-13, 1946; near Patulal, April 8, 1946.

In literature: Barranco Hondo near Alotenango, Sacatepequez; Medio Monte, between Antigua and Escuintla; and Zapote, Escuintla; Costa Grande (Salvin and Godman).

Habits and Hunting.--Similar to those of the subspecies cinnamomeus.

8. Dendrocygna autumnalis lucida Friedmann

Black-bellied Tree Duck

Other Names.--
Guatemalan: pijiji, pichi, pichichil, pichichi, pato chiflador
English: squealer, whistling duck

Status.--This tree duck is undoubtedly a resident; however, its numbers seem to be much increased during the months from November through February, probably by migrants from southern México. It is fairly common locally near the deltas of some of the larger rivers and on marshy lagoons.

Description.--Adults alike. Conspicuously different from most ducks because of the long legs and neck, contrasting black sides and belly, cinnamon brown neck and back, and large white wing patches which are especially noticeable in flight. It is more terrestrial than most ducks and has a more erect carriage. In flight its wing action is slower than most ducks, and its long legs extend well beyond the tail.

Adults.--Forehead and crown, cinnamon brown; sides of head ashy gray; chin and throat whitish; back of head and neck black; lower foreneck pale brown; back and upper breast light cinnamon brown; rump black; lower breast, belly and sides black, in conspicuous contrast to cinnamon brown of upper breast; tail and upper coverts, black; under tail coverts white spotted with black; primaries basally white, terminally black, outer one all black; secondaries black; lesser coverts pale brown; middle coverts ashy white; greater coverts white; inside of wing black; iris brown, bill light red, nail light bluish; feet and legs pink.

Juvenile.--First autumn and winter fairly similar to adult, but less conspicuously marked; paler brown above, grayer below; bill dusky, feet dark reddish.

Measurements.--

Male (10)	Female (9)
Wing, 220-244 (236.3)	Wing, 232-241
Tail, 59.5-72.0 (67.9)	Tail, 65-71
Tarsus, 51.1-64.0 (59.9)	Tarsus, 56.4-63
Exposed culmen, 43.9-55.0 (49.9)	Exposed culmen, 48-53

Records.--Delta of the Río Samalá, 350, January 31, 1947; delta of the Río Nahualate, 55, January 31, 1947; marshes adjacent to the Chiquimulilla Canal near Papaturro, 20, January 29, 1947; near Ocós, 25, February 11, 1947; near Champerico, 1,125, February 11, 1947.

In literature this species has been recorded from: Acapam, Huamachal (Salvin and Godman); Ocós and Hacienda California (Griscom).

Habits and Hunting.--Dickey and van Rossem, who wrote of this species in El Salvador, reported, "Two tree ducks were found on a brackish pool in the forest of Puerto del Triunfo on January 14, 1926, the only occasion when they were seen near the seacoast, and even in this instance they were not actually on salt water . . .

"It is not improbable that these ducks remain mated throughout the year, for singles were rarely seen, even in midwinter. Practically all of the smaller flocks were made up of pairs, and after a bird was shot its companion usually flew about the spot for some minutes after the rest of the flock had disappeared.

"Tree ducks are very active at night, especially so when there is moonlight. In suitable localities flocks or pairs can be heard at almost any hour and their course followed by the continuous plaintive whistling. On August 28, 1925, at about four-thirty in the morning, several pairs were heard flying about in the swamp forest on the north shore of Lake Olomega, and by the aid of hunting lamps several of these were seen. It is probable that they had nests somewhere about. The largest flocks are to be seen in the spring before the nesting season. At one old grass-covered pond in the forest north of Lake Olomega hundreds were to be found at any time during the first half of April 1926. The surface of this pond was overgrown with a mat of grass roots, which extended to a depth of several inches, and here and there old snags of water-killed trees provided good roosting places. Some of these trees were crowded with tree ducks to the last available inch of space. Here they were perfectly safe from human molestation for beneath the green-carpeted surface of the bog were many feet of mud and water.

"The eggs of this duck are persistently sought, since the young when hatched under domestic fowls are tame and are said to make little or no effort to join their wild relatives. However, they do not thrive and if not eaten in the meantime are said to live not more than a year or two. At any rate one or more birds were often seen about native huts, where they ran in and out with other two-legged and four-legged domestic animals and were so tame that they could be picked up and handled without protest.

"Nesting.--The egg-laying season commences about the middle of July. Females killed at San Sebastian between July 15 and 27, 1912, were either laying or about to do so, as was one shot at Lake Olomega, August 19, 1925. A nest found at San Sebastian from which

the female was flushed on July 25, was in the natural hollow of a thick foliaged tree growing in several feet of water. The cavity was about two feet deep and one foot in diameter, nearly round and with the bottom covered with fine, soft chips, evidently pulled or picked from the walls. There was a fair amount of down present. This nest was promptly deserted. Many old sites, from which at one time or another eggs had been taken by the natives, were examined. Usually they were over three feet deep and to get at the eggs large holes had been chopped out of the sides of the trunks, thereby ruining the nests for further occupancy. Some down is always present, according to Morales, who had taken many of their eggs. Downy young only a short time out of the nest were found at Lake Olomega on September 9, 1925. There were about a dozen in the brood, but they scattered into the marsh growth so rapidly and hid themselves so well that only one could be found.

"No occupied nests were found, but we were shown several dead stubs and also two living trees in the forest at Lake Olomega where eggs were said to have been taken from large natural cavities at some distance (up to 50 feet) from the ground. Females taken in January, February, and April were not breeding." (Dickey and van Rossem.)

9. Cairina moschata (Linnaeus)

Muscovy Duck

Other Names.--
Guatemalan: pato real, pato grande
English: black duck, muscovy

Status.--This muscovy duck is apparently a scarce and local resident since it has been observed only in swamp forests near Ocós. It is probably also present on the lower reaches of other rivers on the Pacific coastal plain.

Description.--Adult male. A very large duck (length, 815 mm., tail, 230 mm.) with head, neck, and underparts brownish black, upper parts glossy greenish black; wing coverts extensively white; bill pink, with bare skin at base red.

Adult female.--Much smaller than male (length, 610 mm., tail, 140 mm.).

Measurements.--

Male	Female
Length, 762-815	Length, 610 (about)
Wing, 368 or more	Wing, 317.5
Tarsus, 57.2	
Culmen, 63.5	

General Distribution.--México (Mazatlán and central Tamaulipas) south through Central America and South America to the coast of Perú on the west and to La Plata estuary in the east; casual to the Río Negro, Argentina.

Distribution in Guatemala.--Tropical Zone, in waters of the coastal plains, chiefly along wooded streams.

Records.--Río Samalá near Playa Grande, January 31, 1947; Río Tilapa near Ocós, January 31, 1947; Río Nahualate near the coast, February 11, 1947; near Champerico, February 11, 1947; Río Salinas, southwest of Sayaxché, January 30, 1947.

In literature this species has been recorded from: Lake of Petén, Huamachal, Chiapam, Santana Mixtán (Salvin and Godman); Naranjo (Lantz); Hacienda California (Griscom).

Habits and Hunting.--The following notes on this species in El Salvador are also applicable to Guatemala:

"The degenerate domestic varieties of the Muscovy duck fail utterly to convey an idea of the bird in its wild state. In its native environment of flooded forest it is as trim and graceful as a Canada goose, whether rising with powerful wing-beats from its feeding marsh or winnowing in and out among the trees. During the hotter parts of the day these ducks spend most of their time perched, in pairs or small flocks, on horizontal branches of large trees in the jungle, a location for which their sharp, curved claws are perfectly adapted. The great white shoulder patches, instead of blending in with the light and shade of the surroundings, stand out with startling clearness and often lead to dis-

covery when otherwise the birds would have escaped notice. It is very difficult to steal into shotgun range of these birds, for they are always on the alert and generally fly away at the first suspicious sound or movement. In the early morning and late afternoon they feed in the nearby marshes and, since they habitually go to the same spots, may be shot easily from a blind.

"Females usually are seen in company with an old drake at all times of the year, but there seems to be a great many unattached males which go about in small flocks numbering as many as seven or eight. Most of these flocking males are young birds with only partially developed shoulder patches, but very often adult males may be seen in such groups.

"Muscovies were not found at Barra de Santiago nor at Puerto del Triunfo. In fact, with the exception of a single bird seen at La Unión, all our own records are for fresh water. The superintendent of the railroad repair shops at La Unión told us that he often shot this species about the bays and lagoons in the Gulf of Fonseca, so failure to record it from the two previously mentioned localities is not significant.

"The eggs of this duck are much sought by the natives, for the young are easily reared and take kindly to domestication. Very few pure-blooded birds are to be seen in captivity, for they cross readily with the imported, degenerate, white variety. At Lake Olomega these nondescripts frequently ranged to surrounding marshes in search of food and some of them, during our visit, came to an untimely end in consequence. Domesticated females are said to mate sometimes with wild drakes.

"No occupied nests were found, but we were shown several dead stubs and also two living trees in the forest at Lake Olomega where eggs were said to have been taken from large natural cavities at some distance (up to 50 feet) from the ground. Females taken in January, February, and April were not breeding." (Dickey and van Rossem.)

Near Ocós, Anthony wrote, "Only met with on the fresh-water marshes at Hacienda California, where a few were to be found at any season of the year. The habit that this species has of taking refuge in the trees when disturbed on the water, is quite surprising to one familiar with only the ducks of the north." (Griscom.)

10. Anas discors Linnaeus

Blue-winged Teal

Other Names.--
Guatemalan: azulejo, zarceta, zarzeta azul, zarceta de otoño
English: bluewing

Status.--The blue-winged teal is a migrant and winter resident, more common during migration, when it is observed frequently in the freshwater lagoons of the coastal plains.

Description.--Small, grayish brown duck with conspicuous blue patch in forepart of wing.

Adult male.--Head and neck gray with purplish cast, conspicuous white crescent vertically in front of eye, crown dark, chin black; breast and belly cinnamon rufous, thickly spotted with black; wing with lesser and middle coverts broadly blue, outer part of greater coverts white, secondaries with speculum green; black around base of tail, bordered by white area anteriorly; bill bluish black, iris brown, legs and feet yellowish to orange yellow with dark webs.

Adult female.--Brownish, mottled and spotted with blackish; blue patch on forepart of wing.

Measurements.--
Length, 368.3-406.4
Wingspread, 609.6-792.5
Wing, 177.8-190.5
Tail, 88.9
Tarsus, 27.9-33.0
Culmen, 35.6-40.6

Weight.--
Male (73), 11 oz. to 1 lb. 4 oz.; av. 14.6 oz.
Female (82), 11 oz. to 1 lb. 3 oz.; av. 13.6 oz.

General Distribution.--Breeds in North America east of the Cascades and Sierra Nevada from Great Slave Lake and Lake Winnipeg (rarely to the Gulf of St. Lawrence and northern New England) south to Nevada, New Mexico and Louisiana. Winters south over México, Central America and the West Indies to northern South America (Peru on the west and Cayenne on the northeast).

Distribution in Guatemala.--Lakes and streams of the Republic; most common on Pacific coastal lagoons and marshes. As yet unrecorded in the Petén but probably occurs there occasionally during migration.

Records.--Near Jícaro in the marshes adjacent to the Chiquimulilla Canal, 375, January 29, 1947; marshes fifteen miles east of Iztapa, 500, January 29, 1947; near Iztapa, 75, January 29, 1947; Lake Atescatempa, 350, March 14, 1942; 225, April 26, 1946; January 29, 1947; 50, April 17-20, 1947; Ahumado, January 29, 1947; San José, 1, April 1, 1947; Lake Amatitlán, March 8, 1942; 300, March 16, 1947; Tahuesco, 80, January 31, 1947; and 200, February 11, 1947; Champerico, 225, February 11, 1947; near Sipacate, February 11, 1947; near Ocós, 20, February 11, 1947; Lake Atitlán, several hundred, January 31, 1947.

In literature it has been recorded from: Acapam, Cobán, Dueñas, Santana Mixtán (Salvin and Godman); Lake Atitlán (Dearborn).

Habits and Hunting.--See the general discussion on waterfowl.

11. Anas crecca carolinensis Gmelin

Green-winged Teal

Other Names.--

Guatemalan: zarceta, zarceta a la verde
English: greenwing

Status.--The green-winged teal is a migrant and probably also an occasional winter visitant. The fact that the first record for this species was obtained during the survey would indicate that it is not numerous.

Description.--A small, fast-flying duck with a green speculum in its dark wing.

Adult male.--Head and neck rufous chestnut, green patch on side of head; breast vinaceous, spotted with black; a diagnostic white bar in front of the wing; wing secondaries with speculum of black outwardly and bright green inwardly toward body; middle under tail coverts black, lateral ones cream buff; bill black, iris brown, legs and feet grayish, webs darker. In flight the dark wing and white bar are good field marks.

Adult female.--A small speckled duck; breast and sides with cinnamon wash; dark wing with green speculum.

Measurements.--

Length, 317.5-398.8
Wingspread, 558.8-609.6
Wing, 157.5-190.5
Tail, 66.0-91.4
Tarsus, 25.4-30.5
Culmen, 33.0-40.6

Female slightly smaller than male.

Weight.--

Male (130), 10 to 14 oz.; av. 12.8 oz.
Female (68), 9 to 12 oz.; av. 12 oz.

General Distribution.--Breeds from northern Alaska, northern Mackenzie, Great Slave Lake and Fort Churchill south to California, northern New Mexico and Iowa (formerly), east to Manitoba and Minnesota, locally and rarely to the Gulf of St. Lawrence. Winters in the southern United States, México, northern Central America and the West Indies.

Distribution in Guatemala.--Recorded only in marshes adjacent to the Chiquimulilla Canal, but probably occurs regularly in small numbers at other coastal marshes of the Pacific coastal plain.

Records.--Observed only in the marshes adjacent to the Chiquimulilla Canal near Papaturro, 400, January 29, 1947. This species has not been recorded previously from Guatemala.

Habits and Hunting.--See the general notes on waterfowl.

12. Anas acuta tzitzihoa Vieillot

American Pintail

Other Names.--
Guatemalan: frontino, pato de guias, pato golondrino, pecho blanco
English: pintail, sprig

Status.--The pintail is a common migrant and winter resident, more numerous during migration, especially in coastal waters.

Description.--Slightly smaller than a mallard and more slender in build, with a longer neck and long, pointed tail; belly white.

Adult male.--Gray above, white below; head dark brown with white on neck extending up the side of the head; middle tail feathers very long and pointed, black; wing secondaries with speculum of violet, bronze and green bordered with black and white; area around base of tail blackish, bordered below by white of abdomen; bill grayish blue, nail black; iris dark brown; legs and feet grayish blue, webs dusky. In flight, the trailing edge of the wing has a distinctive light colored margin.

Adult female.--A slender, streaked brown duck, showing a white posterior edge to inner wing in flight.

Measurements.--

Male		Female	
Length,	660.4-762.0	Length,	508.0-609.6
Wingspread,	838.2-914.4	Wingspread,	609.6
Wing,	248.9-284.5	Wing,	243.8-264.2
Tail,	127.0-241.3	Tail,	96.5-127.0
Tarsus,	38.1-53.3	Tarsus,	38.1-43.2
Culmen,	45.7-55.9	Culmen,	43.2-53.3

General Distribution.--Breeds from Arctic coast of northwestern North America east to Hudson Bay, south to southern California, northern Colorado and central Iowa. Winters from southern British Columbia, Mississippi Valley, and Chesapeake Bay to Panamá and the West Indies; Hawaiian Islands.

Distribution in Guatemala.--Chiefly on waters of the Pacific coastal plain, but also on interior lakes. Probably occurs also on the Caribbean coast.

Records.--Lake Amatitlán, 150, January 29, 1947; Lake Atitlán, January 31, 1947; near Papaturro, in the marshes adjacent to the Chiquimulilla Canal, 550, January 29, 1947; near Tahuesco on the delta of the Río Sis, 275, January 31, 1947; and 125, February 11, 1947; delta of the Río Nahualate, near Ahumado, February 11, 1947; delta of the Río Toquina, February 11, 1947; near Champerico, 2,460, February 11, 1947; Lake Retana, March 24, 1942.

In literature it has been recorded from: Lake of Dueñas (Salvin and Godman).

Habits and Hunting.--See the general notes on waterfowl.

13. Mareca americana (Gmelin)

American Baldpate

Other Names.--
Guatemalan: chano
English: widgeon, baldpate

Status.--The baldpate is reported to be a regular migrant and winter visitant, especially along the Pacific Coast, but it is apparently not numerous.

Description.--Slightly smaller than a mallard, sexes dissimilar, both with conspicuous white wing patch.

Adult male.--Mostly brown, head gray with a conspicuous white crown and bright green patch on side of head; wing with a large white patch on forepart very noticeable in flight, speculum green; upper and lower tail coverts blackish in contrast to white of rump and post abdomen; bill grayish blue with top, base and lower mandible black, iris yellowish brown or darker, legs and feet grayish blue, webs darker.

Adult female.--Mostly brown; head gray without white crown, wing with less conspicuous white area on forepart; under tail coverts and belly white.

Measurements.--

Length, 457.2-558.8
Wingspread, 762.0-889.0
Wing, 228.6-279.4
Tail, 101.6-114.3
Tarsus, 33.0-40.6
Culmen, 33.0-38.1

Weight.--

Male (112), 1 lb. 7 oz. to 2 lbs. 8 oz.; av. 1 lb. 11 oz.
Female (73), 1 lb. 2 oz. to 1 lb. 13 oz.; av. 1 lb. 9 oz.

General Distribution.--North America from the Yukon and Mackenzie Basins, mainly east of the Rockies, to Great Bear and Great Slave Lakes to Lake Winnipeg, south to eastern Oregon, northern Colorado, southern Wisconsin and Indiana. Winters from the coast of British Columbia, Mississippi Valley, and Atlantic coast from Long Island southward to Costa Rica and West Indies.

Distribution in Guatemala.--Chiefly on waters of the Pacific coast, but also recorded on several lakes of the interior.

Records.--Delta of the Río Samalá, 200, January 31, 1947; near Tahuesco on the delta of the Río Sis, 170, January 31, 1947; Lake Amatitlán, 7, March 16, 1947.

In literature it has been recorded from: Dueñas, Chiapam, Lake Atitlán, Laguna, Acapam, San Gerónimo (Salvin and Godman).

Habits and Hunting.--See the general discussion on waterfowl.

14. Spatula clypeata (Linnaeus)

Shoveler

Other Names.--

Guatemalan: pato cucharón, cucharudo, pato pinto, pato pintado
English: spoonbill, shoveller, mud duck

Status.--The shoveller is a fairly common migrant and winter visitant.

Description.--A medium sized duck, with a very large and flattened, spoon-shaped bill and a blue wing patch.

Adult male.--Head and neck fuscous, glossed with green; upperparts mostly fuscous; below, lower foreneck and breast white, lower breast and belly bronzy rufous red; post abdomen white; upper and under tail coverts dark greenish; wing with lesser wing coverts blue, greater coverts gray tipped with white; bill black, iris yellow, legs and feet orange red to red. In flight the blue wing patches are conspicuous; seen from below the color pattern, beginning at the head, is composed of five alternate dark and white areas: dark, white, dark, white, dark.

Adult female.--Brownish, with the characteristic large bill and blue wing patch similar to that of the male.

Measurements.--
Length, 431.8-533.4
Wingspread, 749.3-889.0
Tail, 76.2-88.9
Tarsus, 33.0-38.1
Culmen, 63.5-71.1

Weight.--
Male (86), 1 lb.3 oz. to 1 lb. 13 oz.; av. 1 lb. 7 oz.
Female (68), 15 oz. to 1 lb. 10 oz.; av. 1 lb. 4 oz.

General Distribution.--Breeds in the British Isles eastward through Europe and Asia to the Kolyma delta, usually about to the Arctic Circle, and south to France, Turkey, the Black Sea, Transcaspia, Turkestan, northern Mongolia (?), Transbaikalia, Amur, Ussuri and Kamchatka (?). In North America from Kotzebue Sound to the lower Mackenzie and southeastward to Lakes Athabaska and Winnipeg; south to central California, northern New Mexico, Kansas and Indiana. Winters in Europe and Asia from the southern border of its breeding range to northern and eastern Africa, Persian Gulf, India, Ceylon, Burma, southern China and Japan; in North America on the Pacific coast from Puget Sound; inland in the lower Mississippi Valley and on the Atlantic coast from Chesapeake Bay southward regularly to Honduras; the Hawaiian Islands. Many instances of casual occurrence.

Distribution in Guatemala.--Waters of the Pacific coastal plain and probably also along the Caribbean coast. Most often observed on shallow coastal lagoons.

Records.--Lake Amatitlán, 25, January 29, 1947, and 2, March 16, 1947; Lake Atescatempa, 225, March 14, 1942, 40, April 26, 1946; and 75, January 29, 1947; Lake Retana, 1500, March 25, 1942; Lake Atitlán, January 31, 1947; marshes adjacent to the Chiquimulilla Canal, 120, January 29, 1947.
In literature it has been recorded from: Dueñas, Huamachal (Salvin and Godman).

Habits and Hunting.--See the general discussion on waterfowl.

15. Aythya valisineria (Wilson)

Canvasback

Other Names.--
Guatemalan: pato espalda blanca, pato espalda cañamo
English: canvasback

Status.--The canvasback is evidently a rare migrant or winter visitant to lakes and the deeper coastal lagoons.

Description.--A large duck with dark, elongated bill and head, its sloping profile almost a straight line. In flight the long bill, head and neck give the bird a "front-heavy" appearance.
Adult male.--Mostly white, with a reddish brown head and neck, blackish crown and chin, black breast and tail; white underparts except lower breast very finely barred with black; upper and under tail coverts black; bill blackish, iris red, legs and feet bluish, webs darker. In flight, the back and most of wing area white.
Adult female.--Same characteristic profile and flight outline as male. General coloration brown; head, neck and chest reddish brown, belly whitish.

Measurements.--
Length, 508.0-609.6
Wingspread, 863.6-914.4
Wing, 215.9-241.3
Tail, 58.4-86.4
Tarsus, 40.6-45.7
Culmen, 53.3-68.6

Weight.--
Male (102), 2 lbs. 4 oz. to 3 lbs. 9 oz.; av. 3 lbs.
Female (102), 1 lb. 14 oz. to 3 lbs. 6 oz.; av. 2 lbs. 13 oz.

General Distribution.--Breeds from Great Slave Lake and upper Mackenzie Valley south to eastern Oregon, northern Utah, northern New Mexico and southwestern Nebraska, east to central Manitoba and South Dakota. Winters from southern British Columbia, Colorado, southern Illinois and Chesapeake Bay to central México, coasts of the Gulf States and Florida.

Distribution in Guatemala.--Recorded only on a lake near Dueñas.

Records.--This species was not observed during this survey.
In literature it has been recorded only from Dueñas (Salvin and Godman).

Habits and Hunting.--See the general discussion on waterfowl.

16. Aythya collaris (Donovan)

Ring-necked Duck

Other Names.--
English: ringneck, ringbill

Status.--The ring-necked duck is probably a regular though uncommon migrant and winter visitant.

Description.--A small duck about the size of a scaup.
Adult male.--Head and neck black, iridescent, chestnut collar around lower neck; chest, back, and rump black; breast white with white crescent extending conspicuously in front of wing, belly brownish black, sides grayish with fine gray and white vermiculations; tail dark, upper and under tail coverts black; wing with coverts grayish brown, secondaries with light gray speculum. Head has crested appearance, bill grayish blue with black tip and two whitish rings, one at base and one near tip, iris orange yellow, legs and feet grayish blue. In flight the black back and gray wing stripe are diagnostic.
Adult female.--General coloration brown, darkest on head and back, head paler around base of bill and with slightly crested appearance; bill with conspicuous white band near tip, white ring around eye; belly white; wing similar to that of male.

Measurements.--
Length, 393.7-457.2
Wingspread, 635.0-762.0
Wing, 177.8-215.9
Tail, 68.6-86.4
Tarsus, 30.5-35.6
Culmen, 43.2-50.8

Female smaller than the male.

Weight.--
Male (23), 1 lb. 5 oz. to 1 lb. 15 oz.; av. 1 lb. 11-1/2 oz.
Female (23), 1 lb. 3 oz. to 1 lb. 13 oz.; av. 1 lb. 8-1/2 oz.

General Distribution.--Breeds in North America chiefly from Lake Athabaska and northern Alberta and Saskatchewan southeastward to Manitoba and thence south to North Dakota and Wisconsin. Breeds also in southern British Columbia, Oregon, northern California and Nebraska. Winters in southern United States (chiefly Gulf Coast and Florida) south to Guatemala, the Bahamas and the Greater Antilles.

Distribution in Guatemala.--Recorded on the Pacific Coast, at Lake Petén, and on interior highland lakes. Probably present occasionally on lagunas of the Caribbean coastal plain.

Records.--Lake Petén, flock of twenty, January 30, 1947.
In literature it has been recorded from: Cobán, Lake of Dueñas (Salvin and Godman).

Habits and Hunting.--See the general discussion on waterfowl.

17. Aythya affinis (Eyton)

Lesser Scaup

Other Names.--
Guatemalan: pato chaparro
English: scaup, bluebill

Status.--The lesser scaup is reported to be a common migrant and winter resident.

Description.--A medium-sized diving duck, sexes dissimilar.

Adult male.--Winter plumage: Head and neck black with purple iridescence; upper back black, lower back and scapulars grayish due to black vermiculations on white background, rump blackish; back of neck extending low on breast, belly white, abdomen brown; wing brownish, secondaries and inner primaries with white speculum, making conspicuous white band across back part of wing; tail and coverts blackish; bill grayish blue, with black nail, iris, legs and feet bluish to dusky, webs often blackish.

Adult female.--Winter plumage: Head and neck brown, cheeks lighter and a conspicuous white area on face at base of bill; back dark brown; chest and sides grayish brown, lower breast white; wing with all coverts and primaries grayish brown, secondaries with white speculum, bordered behind with brown; tail dark brown; bill dark gray with indistinct ring of lighter gray near tip, nail blackish; iris yellowish; legs and feet dark bluish gray, webs darker.

Measurements.--

Length, 381.0-457.2	
Wingspread, 762.0	
Wing, 190.5-208.3	
Tail, 48.3-68.6	Female smaller than the male
Tarsus, 30.5-38.1	
Culmen, 38.1-48.3	

Weight.--
Male (112), 1 lb. 6 oz. to 2 lbs. 5 oz.; av. 1 lb. 14 oz.
Female (118), 1 lb. 3 oz. to 2 lbs. 2 oz.; av. 1 lb. 12 oz.

General Distribution.--Breeds from the middle Mackenzie Valley and Lake Athabaska to western Ontario and south (east of the Cascades) to Oregon, Utah, and Nebraska; formerly to northern Illinois. Winters chiefly from the southern United States south to Panamá and the West Indies.

Distribution in Guatemala.--Recorded only at interior lakes but it undoubtedly frequents coastal waters during migration.

Records.--Lake Amatitlán, 125, March 8, 1942; 350, January 29, 1947; up to 750 seen in a single day, March 14-16, 1947; Lake Atitlán, common, March 5, 1942; May 1-2, 1946, and January 31, 1947; Lake Atescatempa, 30 March 15, 1946.

In literature it has been recorded from: Lake of Dueñas and Atitlán (Salvin and Godman).

Habits and Hunting.--See the general discussion on waterfowl.

18. Nomonyx dominicus (Linnaeus)

Masked Duck

Other Names.--None known
None known.

Status.--The masked duck apparently is a very rare migrant or resident.

Description.--Slightly smaller than the ruddy duck but similar in build; wing with a conspicuous white patch; male with most of head black; female with two dark stripes on side of head.

Adult male.--A very small, chunky, cinnamon red diving duck with a long, spike tail; forward half of the head black, posterior part, neck and upper breast cinnamon red, lower breast and belly whitish; wings dark with speculum and part of coverts forming a conspicuous white patch. Bill smaller than that of ruddy, upper part pale blue, with

ridge and tip black, lower mandible whitish, tipped with black; eye dark brown, eyelids pale blue; legs and feet, outer side of leg and two outer toes dark brown or black, inner side of leg, inner toe and webs light brown spotted with black.

Adult female.--A very small, brownish black diving duck with a striped head and long tail; crown, stripe through eye and one across cheek forming three somewhat parallel bands separated by areas of cream or buff; neck, upper breast and back dark brown, feathers edged with buff, or buffy white, lower back, scapulars and rump brownish black, feathers tipped with buff; tail brownish black; breast whitish, belly grayer; wings dark brown with white speculum smaller than in male.

Measurements.--

Male (6)	Female (3)
Wing, 132-146 (140.1)	Wing, 135-137 (136)
Tail, 72-85 (79.6)	Tail, 72-78.5 (74.2)
Tarsus, 26.8-28.3 (27.6)	Tarsus, 26.5-28.5 (27.8)
Culmen, 32-34.5 (32.9)	Culmen, 31-33.5 (32.5)

General Distribution.--Greater Antilles and South America to Chile (Concepción), northern Argentina (Tucuman) and eastern Argentina (Buenos Aires Province). Occasional in México, Central America and the Lesser Antilles.

Distribution in Guatemala.--The occurrence of this species is based on a single specimen, with no locality listed.

Records.--This species was not observed during this survey.

In literature there is only one record, that of an old "trade-skin" labeled Guatemala, which lacks the data as to specific locality.

Habits and Hunting.--Because of the rarity of this species in the Republic, no further information is included. Available notes all pertain to its occurrence and habits in other countries, chiefly in South America.

19. Oxyura jamaicensis rubida (Wilson)

Ruddy Duck

Other Names.--

Guatemalan: pato bola. In México called pato sonso and pato tepalcate.
English: butterball, spiketail

Status.--The ruddy duck is apparently a regular winter visitant, though very few in numbers.

Description.--A small, chunky duck; male with erect, fan-like tail, dark back and crown, white cheeks; female of similar build but tail not carried erect, cheeks lighter than crown but not white.

Adult male.--Winter plumage: crown and nape blackish brown; cheek and chin white; back and rump dark brown, faintly barred with gray; tail blackish brown, feathers stiff, narrow and pointed; throat and neck grayish brown; underparts whitish, marked with many fine, broken bars of grayish or brownish; legs and feet dark bluish gray, iris reddish-brown.

Adult female.--Winter plumage: similar to that of male but smaller and with crown dark brown, barred with reddish brown; cheeks pale gray with a dark stripe from corner of bill to back of cheek, paralleling the border of the crown; bill duskier than in male.

Measurements.--

Length, 342.9-431.8
Wingspread, 508.0-609.6
Wing, 139.7-154.9
Tail, 61.0-68.6
Tarsus, 27.9-38.1
Culmen, 35.6-43.2

Weight.--

Male (8), 1 lb. 3 oz. to 1 lb. 12 oz.; av. 1 lb. 5-1/2 oz.
Female (13), 11 oz. to 1 lb. 7 oz.; av. 1 lb. 2 oz.

General Distribution.--Breeds in North America from central British Columbia, Great Slave Lake and Lake Winnipeg south to northern Lower California, Arizona, New Mexico, Nebraska, Iowa, and Wisconsin; casually east to Massachusetts and south to Central America. Winters on the Pacific coast of California and from the southern limit of breeding range to México and the Gulf States; on the Atlantic coast from New York to Florida.

Distribution in Guatemala.--Observed only at Lake Atitlán and near Dueñas; however, it probably occurs at times on coastal lagoons.

Records.--Lake Atitlán, March 5, 1942, and May 1, 1946.
In literature it has been recorded from: Dueñas and Lake Atitlán (Salvin and Godman).

Habits and Hunting.--See the general discussion on waterfowl.

20. Crax rubra rubra Linnaeus

Central American Curassow

Other Names.--
Guatemalan: pajuil, pavón
kambul (Maya)
English: turkey, pheasant, curassow

Status.--This curassow is a fairly common resident within its range except in areas where clearing of the forest has reduced or eliminated its habitat, or where intensive hunting has depleted its numbers.

Description.--A large bird about the size of a turkey (length 762.916 mm. for the genus), head crested, bill large and heavy, highly arched.
Adult male.--Bill with a yellow cere, plumage of head, neck, wings, tail, and body dark glossy, greenish black except for the lower part of the abdomen, the flanks and under tail coverts, which are white; iris red, legs and feet horn color.
Adult female.--Variable in coloration, with at least three color phases recognized: dark phase, red phase, and barred-backed phase. In the first, the feathers of the head, neck, and upper two-thirds of the throat blackish banded subterminally with white, giving a barred appearance; crest feathers black with a broad white band; back of neck, lower throat and upper breast slaty-black with a slight greenish gloss; back and rump dark chestnut-brown marked with blackish; wing with the primaries and outer secondaries bright chestnut mottled with black; tail variable in color from black to brown, barred with paler on the abdomen, flanks and under tail coverts; bill yellowish, legs and feet "pinkish gray."

Measurements.--

Male (11)	Female (7)
Wing, 365-445 (388)	Wing, 355-410 (372.4)
Tail, 305-362 (331.3)	Tail, 315-345 (322)
Tarsus, 113-127 (117.8)	Tarsus, 108-117 (112.4)
Culmen from cere, 27-33.5 (31.5)	Culmen from cere, 24-30 (27.2)

General Distribution.--Southern Tamaulipas and the Isthmus of Tehuantepec south throughout Central America to western Ecuador.

Distribution in Guatemala.--Tropical Zone forests of both coasts and locally in the interior up to elevations of at least 4,000 feet.

Records.--Tiquisate, April 9-12, 1946. It was reported by local hunters to be present at: San José, in forests to the west; near Champerico and Ixtán; near Sipacate, Escuintla; near Cotzal, below Finca San Francisco, El Quiché; near Panzós.
In literature: Uaxactún (Van Tyne); Lake of Petén, Chilomo, Savana Grande, Raxché, "Vera Paz" (Salvin and Godman); Los Amates (Dearborn); Santo Tomás, south of Puerto Barrios and Naranjo, Escuintla (Lantz); between Sepacuité and Panzós (Griscom).

Habits and Hunting.--In general, the notes given for the pava (Penelope) apply also to the pajuil. The latter differs in being less wary, less noisy, and more often seen on the ground. During midday these big birds often rest in the shade of shrubs, instead of roosting in trees. Much of their food is obtained on the ground.

Because of their less wary nature, they are more easily exterminated by overshooting than are the pavas.

21. Penelope purpurascens purpurascens Wagler

Northern Crested Guan

Other Names.--
Guatemalan: pava, cojolite, coxolite, ajolite, ah cox (Maya), quam
English: pheasant

Status.--This guan is a fairly common resident within its range except in those localities where clearing has seriously reduced or eliminated its forest habitat.

Description.--A large blackish bird (length about 558-890 mm.) but smaller and more slender than the curassow or pajuil (Crax). Sexes alike.

Skin around eye and on upper throat bare; an erectile crest of flat, soft, blackish feathers; tail as long or longer than wing. Brownish-black coloration of plumage has a slight greenish-bronze or purplish sheen; feathers on sides of neck, lower throat and breast are narrowly edged with white laterally; scapulars and upper wing coverts also with narrow lateral white edges; lower abdomen and lower back dull dark brown; iris carmine; orbital area blackish; bill black; upper part of bare throat blackish, lower part carmine; tarsus red.

Immature birds are similar to adults but with the white markings on the scapulars and upper wing coverts much less developed.

Measurements.--

Male (8)	Female (6)
Wing, 370-415 (390.6)	Wing, 362-390 (380)
Tail, 350-408 (384)	Tail, 372-408 (385.5)
Tarsus, 81-90 (85.1)	Tarsus, 81-90 (85.1)
Culmen from base, 32-44 (36.1)	Culmen from base, 32-44 (36.1)

General Distribution.--Tropical forest region of México from Sinaloa and southern Tamaulipas south to Honduras.

Distribution in Guatemala.--Tropical Zone forests of both slopes, ranging at least up to 6000 feet.

Records.--Tiquisate, April 9-12, 1946; Finca Valle-Lirios, Escuintla, March 23-25, 1947; San José, April 1-6, 1947. Panzós, May 16-18, 1947. It was reported by local hunters at: Champerico, Patulul, and near Cotzal and Chajul, El Quiché.

In literature: Retalhuleu, Savana Grande, Volcán de Fuego, Medio Monte, and Raxché (Salvin and Godman); Los Amates (Dearborn); Naranjo and Santo Tomás (Lantz); Finca Sepacuité (Griscom), Uaxactún and Sacchich (Van Tyne).

Habits and Hunting.--Under primitive conditions this guan is to be found in flocks, feeding resting, and roosting in the tall trees which comprise the crown of the forest. In more open gallery forest they can be seen perched in the treetops for a distance of several hundred yards, because of their large size. Their calls are loud and serve to guide hunters to them. During the dry season it is difficult to stalk them unless the drift of leaves on the forest floor is moist, enabling the hunter to slip within range.

At times, in the early morning, they were seen feeding in isolated trees just beyond the edge of the dense forest. If disturbed, they began giving their loud alarm calls, walked along the branches, and finally flew to the tops of tall trees along the forest border, continuing to call as they flew. If stalked unsuccessfully, they flew farther into the forest, the noise of their large wings being heard even though the forest canopy screened them from view.

Most of their feeding is done early and late in the day, when they seek wild fruit, seeds, and succulent leaves. Important food plants are the Cecropia sp., wild papaya, and figs.

They apparently breed during the rainy season as their gonads showed no enlargement during April.

This species is one of the most sought after game birds as it is large enough to provide several pounds of meat. In areas of virgin jungle it is not so wary but that a good hunter equipped with a modern rifle or shotgun can secure several during the day's stalking.

The relative abundance of this species depends largely upon the extent to which the virgin tropical forests are cleared. In forest areas of the limited extent surrounded by agricultural lands, the combination of changes in environment and increased hunting pressure soon makes the pavas few in number and wary in habit. In undisturbed forest, however, hunting pressure alone apparently does not endanger their survival.

22. Ortalis vetula vetula Wagler

Oaxaca Chachalaca

Other Names.--
Guatemalan: chacha, chachalaca, faisan
English: brush pheasant

Status.--This chachalaca is reported to be a common resident within its range.

Description.--Chachalacas are about the size of a small pheasant (length about 412-649 mm.); sexes alike, plainly colored, brownish above, more grayish, paler beneath; head moderately crested, upper throat red,-bare except for a narrow longitudinal median strip of feathers; tail longer than wing; strongly rounded, the twelve feathers broad, with rounded tips much darker than back. Juvenile specimens are similar to the adults in general appearance. Subspecific characteristics of coloration are as follows: sides of upper throat olive, tips of tail feathers dull buffy brown, not bicolored; lower abdomen dark buffy brown; wing less than 230 mm.

Measurements.--

Male (8)	Female (5)
Wing, 177-202 (192.8)	Wing, 181-195 (186.6)
Tail, 197-225 (214.3)	Tail, 208-227 (215.6)
Tarsus, 58-65 (62)	Tarsus, 54-60 (56.6)
Exposed culmen, 24-28 (25.9)	Exposed culmen, 22-25 (23.4)

General Distribution.--Southeastern México (but not Yucatán Peninsula) from Vera Cruz and northern Oaxaca south on the Caribbean slope of Guatemala (but not the coastal plain) and parts of Belize (British Honduras) to about latitude 16° N.

Distribution in Guatemala.--Tropical Zone forests of Alta Vera Paz.

Records.--Panzós, May 16-18, 1947; it is reported by George Brol to be common near Finca San Francisco, below Cotzal, El Quiché.

In literature: Sierra de las Minas (Griscom, Ibis, 1935); Sepacuite, Secanquim, and Finca Chama, all in Alta Vera Paz (Griscom, 1932:101); Cobán (Grant).

Habits and Hunting.--See the comments for the subspecies leucogastra.

23. Ortalis vetula intermedia Peters

Petén Chachalaca

Other Names.--
Guatemalan: chacha, chachalaca
ixbach (Maya)

Status.--The Petén chachalaca is reported to be fairly common along the forest borders and in the more open woodlands of its range.

Description.-Similar to the subspecies vetula, except that the tips of the tail feathers are light grayish brown; wing averaging slightly shorter, tail slightly longer, abdomen light brown.

Measurements.--

Male (3)	Female (2)
Wing, 181-190 (186.6)	Wing, 172-183
Tail, 225-258 (237)	Tail, 215-235
Tarsus 58-65 (61.8)	Tarsus, 62.5-64
Exposed culmen, 23.5-27 (25)	Exposed culmen, 22-24.5

General Distribution.--Southern part of the Territory of Quintana Roo and probably adjacent parts of Campeche, northern Belize (British Honduras), and the Petén.

Distribution in Guatemala.--Tropical Zone forests and brushlands of the Petén.

Records.--It is reported by local hunters to occur near La Libertad, El Petén.
In literature: The race has been recorded from Uaxactún and Chuntuqui (Van Tyne).

Habits and Hunting.--See the comments under leucogastra.

24. Ortalis vetula plumbiceps G. R. Gray

Plumbeous-capped Chachalaca

Other Names.--
Guatemalan: chacha, chachalaca, faisán

Status.--The plumbeous-capped chachalaca is reported to be a relatively common resident in the more open, drier woodlands of its range.

Description.--Similar to the subspecies vetula, except that the tips of the tail feathers are noticeably bicolored, the basal part of the tip tawny brown, the outer part grayish to whitish.

Measurements.--

Male (1)	Female (2)
Wing, 189	Wing, 180-194
Tail, 238	Tail, 230-241
Tarsus, 66	Tarsus, 63-65
Exposed culmen, 25	Exposed culmen, 23.5-24

General Distribution.--Southeastern Guatemala and northwestern Honduras south to the highland region of central Nicaragua.

Distribution in Guatemala.--Tropical Zone forests of the lower Motagua Valley and near Puerto Barrios; probably also in the lower Polochic basin.

Records.--Progreso, El Progreso, March 26, 1942, and May 9, 1947; Cabanas, Zacapa, May 8, 1947. It is reported by local hunters to occur near Gualán and Bananera.
In literature: Gualán and Los Amates (Dearborn); Virginia Plantation near Puerto Barrios (Griscom); Gualán and Quiriguá (Carriker and de Schauensee).

Habits and Hunting.--See the comments under leucogastra.

25. Ortalis vetula leucogastra (Gould)

White-bellied Chachalaca

Other Names.--
Guatemalan: chacha, chachalaca, faisán
English: brush pheasant

Status.--The white-bellied chachalaca is a very common resident of the drier woodlands on the Pacific coastal plain.

Description.--Similar to subspecies vetula except belly, abdomen, crissum, and under tail coverts white, and tips of tail feathers white.

Measurements.--

Male (3)	Female (2)
Wing, 207-220 (215.6)	Wing, 200-203
Tail, 197-212 (202.6)	Tail, 195-197
Tarsus, 52-55 (53.6)	Tarsus, 50-54
Exposed culmen, 27 (27)	Exposed culmen, 24-25

General Distribution.--Pacific slope of Guatemala, El Salvador, and northern Nicaragua.

Distribution in Guatemala.--Tropical Zone woodlands of the Pacific slope, ranging up to elevations of at least 2,000 feet.

Records.--Cerritos, Santa Rosa, March 28, 1946; Tiquisate, April 11-15, 1946; San José, April 2-6, 1947; Patulul, April 14, 1947; Finca Valle-Lirios, Escuintla, March 23-25, 1947; Finca Helvetia, Quetzaltenango, April 10-13, 1947; Friajanes, Guatemala, April 17, 1947. It was reported to us by natives at: Lake Atescatempa, April 27, 1947, and April 17-20, 1947; Chocolá, Suchitepequez, March 9, 1947; Escuintla, April 1946 and 1947; Chiquimulilla, March 26, 1946.

In literature: Retalhuleu and Costa Grande (Salvin and Godman); San José (Dearborn); Naranjo, Escuintla (Lantz); Hacienda California, Quetzaltenango (Griscom from Anthony); Finca Cipres and Finca El Espino, Suchitepéquez (Griscom).

Habits and Hunting.--Of this game bird, in El Salvador, Dickey and van Rossem wrote, "Unlike their larger relatives, chachas are not averse to cultivated tracts. In fact they may be said to favor the vicinity of small villages and isolated huts in preference to more primitive places. At Puerto del Triunfo they were much more common within a mile or two of the village than they were in the more distant jungle. The "backyard" of our quarters at that place--an abandoned hotel on the equally abandoned main street--was a dense patch of tall jungle with a thick undergrowth of coyol palm. This piece of perhaps twenty acres was surrounded on all sides by open fields and on three by occupied huts, yet there were at least ten chachas living there. Although considerable shooting was done, they never left the locality and every evening at dusk could be seen flying to roost in a big, spreading tree. Altogether it is apparent that chachas are entirely capable of taking care of themselves and will doubtless survive for many years after Crax and Penelope have become extinct locally.

"The preferred habitat is swampy jungle with coyol-palm undergrowth, although in the hill country about Lakes Guija, Olomega, and Chanmico they took readily to thick, second-growth scrub and were almost as common there as in the coyol swamps. Chachalacas are partly arboreal, partly terrestrial, but escape is invariably by flight. The first flurry takes them, when surprised on the ground, into the thickest available tree, through whose smaller branches and protecting vine mat they slip to the farther side and then leave with surprising noiseless flight.

"The loud, ringing calls of the males are most often heard in the early morning between dawn and sunrise. The first bird to begin will usually start every male in the neighborhood, and the woods for an hour or more resound with their crowing. The long, extraordinary trachea, the loop of which reaches nearly to the end of the sternum, produces a volume and power which remind one of the bugling of a crane, and a full-voiced old male can be heard a mile away. The three-or-four note crow or bugle, when softened by distance, has a ringing, semi-metallic quality. It is one of the longest-to-be-remembered forest sounds, and its recollection recalls more clearly than any other memory the palm swamps and mangrove-fringed lagoons where it was most often heard.

"A female taken at Barra de Santiago, April 15, 1927, was laying. A nest found at Lake Guija, May 28, 1927, contained three white, and exceedingly rough-shelled eggs which were on the point of hatching. This nest was placed conspicuously thirty feet from the ground in a tall, slim sapling which rose above the surrounding brush. It was in a triple crotch, and in size, appearance, and structure was very similar to a crow's nest. The center was rather shallow, more saucer-like than cupped, and the eggs were lying on a lining of flattened leaves. Two half-grown young were taken July 26, 1912. Salvin and Godman, however, found fresh eggs and newly hatched young in March in western Guatemala and state that two eggs constitute the ordinary number."

26. Penelopina nigra (Fraser)

Guatemalan Black Chachalaca

Other Names.--
Guatemalan: cojolita, cayaya, kiyi, pasha
English: black pheasant, black chachalaca

Status.--The black chachalaca is reported to be a relatively uncommon resident of the subtropical Zone forests on the higher mountains.

Description.--Built like a slender pheasant, black in coloration, slightly larger than Ortalis (length 534-635 mm.), with the chin, as well as the throat, bare and red in color. A conspicuous dewlap is present on the lower part of the throat.

Measurements.--

Male (5)	Female (8)
Wing, 223-266 (247)	Wing, 226-254 (240.1)
Tail, 265-300 (282)	Tail, 274-312 (289)
Tarsus, 72-81 (77.7)	Tarsus, 67-79 (76.3)
Exposed culmen, 24.5-26.4 (25.6)	Exposed culmen, 22.5-26.5 (24.8)

General Distribution.--Recorded only from the State of Chiapas, México; Guatemala and Nicaragua.

Distribution in Guatemala.--Subtropical Zone forests of the high mountains.

Records.--This species was reported by local hunters to occur at: Nebaj, in the dense mountain forests; on the higher mountains near Sololá, Quetzaltenango, and San Marcos, and at San José Pasulin. One of these birds was seen in the heavy forest above Finca Helvetia on April 10, 1947, and their calls were heard there, and near Nebaj, April 26, 1947.

In literature it has been recorded from: Cobán, Volcán de Agua, Volcán de Fuego, El Rincón, and San Marcos (Salvin and Godman); Chimoxán (Griscom).

Habits and Hunting.--This species occurs in the rain forest of the high mountains. Dickey and van Rossem (1938) wrote, "The habitat of Penelopina nigra is on the steep, heavily forested slopes and ravines of the wildest part of the mountains, where the undergrowth of the ferns, moss-covered fallen logs and underbrush is densest." Regarding roosting places they wrote, "It appears that the black chachas roost in the highest pines; at least many of them do so."

When being hunted, the black chacha attempts to escape by running through the undergrowth, or if dense tall cover is near, by a low, short flight. If surprised in a tree while feeding or roosting, it often hops from branch to branch, to another tree. Of this species, Griscom quoted Anthony as follows, "Well distributed in the high, forested parts of northern Guatemala. It was reported from the volcanoes near Antigua. At San Lucas the natives had parts of its plumage and assured me it was common on the volcanoes there. Near Barrillos and Nebaj the birds could be heard, but none were seen. A pair was shot near Sepacuite, where the birds were not rare but, as wherever found, very hard to secure. The natives state that they are always found in pairs, male and female, and if the male is shot, the female will linger in the near vicinity until she, too, falls, a statement sustained by my own limited experience. A pair of these beautiful birds was living with the fowls at La Primavera, and were much more tame than the chickens. They had the free run of the yard and often flew to the nearby forest, to be gone, perhaps, for hours, but always returned before night to roost in a tree in the dooryard. The native name, Kiyi, is supposed to be a more or less correct rendition of its note. However, I could not see much resemblance. The only cry that I ever felt sure came from this species was a sharp yelp, difficult to repeat."

Regarding roosting habits they wrote, "A short time after sundown we began to hear the curious, whirring rattle and saw, here and there, males flying from the ravine undergrowth to the pine tops. This noise sounds very much like a policeman's rattle and is given on a descending scale . . . Once in the trees these birds were completely hidden, both because of the masses of parasitic growth and the poor light . . . I saw no females, nor more than a single male go to a tree.

"The natives say two or three white eggs are laid and that very often the nest is only a few twigs placed in the crown of a tall tree fern . . . The female taken on February 26 was laying (about 8,000 feet, Los Esemiles, El Salvador, Dickey and van Rossem).

"The shrill, astoundingly human whistle of the male black chachalaca was one of the first sounds heard in the ravine of the cloud forest on Los Esemiles. It was one of the last birdcalls to be positively identified, for although collecting commenced there on February 1, it was the 23d before a whistler was finally stalked and shot." (Dickey and van Rossem.)

Those heard in the rain forest above Finca Helvetia gave the strange whistles so much like those made by a human being; and also cackling, yelping notes, slightly suggestive of Ortalis.

The preceding paragraphs indicate the difficulty of shooting these mountain dwellers. During three of the days we hunted above Finca Helvetia in the heavy forest, they were heard several times and a fleeting glimpse obtained of one individual that had been calling from a fallen, fern-covered log surrounded by dense herbaceous growth from two to five feet high. A bird dog would be invaluable in hunting this species.

It seems probable that the best season to hunt black chachas is from September through January, as nesting apparently begins in February.

27. Oreophasis derbianus G. R. Gray

Horned Guan

Other Names.--
Guatemalan: faisán, faisán cornudo, khannanay
English: horned turkey, mountain turkey

Status.--Reported to be a relatively common resident of the more isolated, Temperate Zone mountain forests.

Description.--A large bird of turkey size (length about 812-915 mm.) with a round, upright, bony knob or casque projecting from the crown of its head; wing large and broad; tail long and broad but slightly shorter than wing, rounded, the twelve tail feathers also rounded.

The adults have the head, neck, back, scapulars, wing coverts and upper tail coverts glossy black, mostly with a bluish sheen; rump sooty black, black tail crossed by broad white band near base, abdomen and under tail coverts paler black; foreneck, breast, and belly white with narrow black shaft streaks. The bill is pale straw yellow; iris, white; knob red; legs and feet red.

Measurements.--

Male (1)	Female (6)
Wing, 394	Wing, 332-378 (362)
Tail, 350	Tail, 300-368 (329.1)
Tarsus, 83	Tarsus, 80-92 (85.1)
Exposed culmen, 21	Culmen, 19-23 (21.1)

Weight.--About five pounds.

General Distribution.--Highlands of western Guatemala (mountains above Huehuetenango, Volcán Zunil, Volcán de Fuego) and adjacent portions of the State of Chiapas, México.

Distribution in Guatemala.--Temperate Zone forests of the high mountains in the western and central parts of the Republic.

Records.--This species was reported by local hunters to be in the dense cloud forest on Volcán San Lucas near San Lucas, Sololá; between Chemal and Barrillas, Huehuetenango, in the high, virgin forests; and near Cotzal, El Quiché, in the high mountain forests.

In literature: Volcán de Fuego (Sclater and Salvin, 1859:224); Chiacamán, east of Uspantán, El Quiché (Salvin, 1874:188); Cerro Zunil (Salvin and Godman); Volcanes San Lucas, Tacana, and Tajamulco, also Santa Ilania near Tecpám (Griscom).

Habits and Hunting.--Griscom (1932) quotes Anthony, "The Faisán, as it is known to the natives, was found on the higher elevations of the Volcán San Lucas at 10,000 feet and above. Here they were feeding on the fruit of a large tree, were quite hard to discover, and still more difficult to secure."

Of this species and its habits on Volcán de Fuego, Salvin wrote, "In the early morning we usually found them in the upper branches of trees searching for their favorite fruit, which they eat both ripe and unripe: as the day advances they descend to the underwood, where they remain all day, basking or scratching among the leaves." This favorite fruit, he reported, is a species of Prunus.

The hunting of the horned turkey is difficult because of its very restricted occurrence in a few localities, at high elevations in the dense mountain forests.

28. Dendrortyx leucophrys leucophrys (Gould)

Guatemalan Long-tailed Partridge

Other Names.--
Guatemalan: guachoco, guachoque
English: partridge

Status.--A locally common resident, especially in second-growth brushy woodlands.

Description.--Large, long-tailed, partridge-like birds (length about 350 mm., wing about 150 mm.); forehead buffy, chin white; bill relatively large and heavy; tail usually slightly shorter than wing, twelve tail feathers, their tips rounded.

Adults with forehead and fore part of the crown pale yellow to buff, rest of crown brown tinged with russet; nape and interscapulars bright russet, feathers conspicuously edged with white; back, rump, and upper tail coverts buffy brown, crossed with dusky bars; outside tail feathers bright russet, the others duller, crossed with transverse zigzag markings of light buff; chin and upper throat white, sides of throat russet, each feather edged with gray; breast feathers similar to last but with edges broader and darker; upper abdomen and sides pale brown; middle of abdomen, flanks, and under tail coverts dusky olive brown. Bill black, lower part orange below, iris grayish-olive, skin around eye orange-red, feet and legs brownish red to orange-red.

Measurements.--

Male (1)	Female (1)
Wing, 146.3	Wing, 139
Tail, 128	Tail, 123.7
Tarsus, 53.3	Tarsus, 49
Culmen from base, 18.1	Culmen from base, 18.5

General Distribution.--Highlands of northern Guatemala.

Distribution in Guatemala.--Subtropical and Temperate Zones, wooded highlands of northern Guatemala.

Records.--It has been recorded near Nebaj, April 25 and 26, near Chajul, April 27, 1947; near Progreso, El Progreso, May 9, 1947; Panzós, May 17, 1947.

In literature it has been recorded from: Cobán (Salvin and Godman); Sepacuite, Barrillos, and Nebaj (Griscom).

Habits and Hunting.--These notes apply to both subspecies. This partridge is found in second growth and heavy forest, at altitudes of from about 2,000 to above 8,000 feet. It was reported to occur near Escuintla as low as 1,000 feet.

At Finca Helvetia several were heard calling from the huatales or brush-covered hills at from 3,000 to 5,500 feet. The forest had been cleared from these areas and as the dense brush clothed the slopes, the guachoques ventured forth into the new cover. When hunted on these hills, they evidently ran like rails ahead of us for we were unable to flush them.

Mr. Percy Davies, manager of Finca Helvetia, told us that these birds were occasionally seen in those coffee groves adjacent to the huatales and the forest. Dickey and van Rossem reported that, " . . . a good many of these birds lived in a dense, almost impenetrable area of second growth which had reached a height of perhaps twenty feet and

which was covered for the most part with a blanket of creepers and thorny vines. From this cover they occasionally ventured out into the coffee groves to scratch among the deep litter." They mentioned a flock of several observed in March scratching in a litter of oak leaves near a dense brushy area. They were heard and seen in the mountains near Nebaj up to 8,000 feet or higher in the oak association. There they were less common than at lower elevations, but frequented similarly dense habitats. Those seen or heard at close range were in heavy second growth, the rank, shrubby undergrowth, or in brushy, weedy clearings.

Griscom, quoting Anthony, wrote, "This species is by no means uncommon in the highlands of northern Guatemala, but one that is apt to pass unrecorded by many careful observers. Above 3,000 feet elevation it was often heard calling, at all hours of the day, from the heavy undergrowth of the mountain sides, but we were unable to gain sight of a single bird. Natives, who told me that they could easily bring me specimens, were offered a full day's wages for each and every bird delivered, but they were unable to claim the reward. I was told that when hunted by dogs the birds would tree and, from a perch a few feet above the animals, sit and watch them, while the hunter crept up and shot the birds, one by one, or even captured them alive by snaring them with a noose at the end of a slender pole.

"At Sepacuité, while hunting Chachas, a bird that I took to be of that species darted across the trail and into the undergrowth ahead of me; an instant later another followed and, warned by the first, I was not taken entirely by surprise and fired at the hole in the brush as the bird flashed from sight. A moment later I was admiring the only specimen of the Tree Quail I secured in Guatemala. This species was quite common on the hills about Barrillos and Nebaj, the calls being heard at all hours. The single note, which has gained it the native name of Guachoque, is far reaching and melodious. On the lower slopes of Volcán San Lucas I heard the notes several times, and learned the species was found above Tecpam, but did not see the bird."

This species is reported to band together in flocks after the breeding season. According to Dickey and van Rossem, "It would appear that they habitually travel in small flocks which break up into pairs as the breeding season approaches. In December, on Mt. Cacaguatique, a roosting tree perhaps ten feet higher than the surrounding growth was the gathering place every evening for a fair number of birds, possibly members of more than one flock, for the calls of the entire neighborhood, as dusk came on, finally converged toward this one spot."

Our field work was limited to months during which the guachoque was breeding and those encountered were singles or pairs. Because of the density of the cover and their shyness, none was seen at close range except as a blurred image disappearing into adjacent heavy vegetation. They evidently retreated farther on foot after such a flight, for those we pursued often were not flushed again.

This is an exceedingly difficult bird to hunt, as the preceding notes have already indicated. We were unable to flush any in short cover, where a wing shot would have been possible; instead they eluded us by running quietly and unseen. In the woodland, the density of cover, poor visibility, and very brief view of the fast-flying bird combined to make shooting them almost impossible.

Our hunting, however, was being done to secure specimens for the museums, and was limited to the months of April and May. Hunting should be done during the period September through January, prior to the nesting season. At that season, they apparently occur in coveys and are said to be somewhat easier to hunt. In all probability the use of a well-trained dog will make this sport more productive since these localities have few ticks and insect pests, at least at the times of our visits.

29. Dendrortyx leucophrys nicaraguae Miller and Griscom

Nicaraguan Long-tailed Partridge

Other Names.--
Guatemalan: guachoco, guachoque
English: partridge

Status.--A locally common resident, especially in second-growth, brushy woodland.

Description.--Similar to the preceding form, D. l. leucophrys, except as follows: auriculars sooty gray instead of brown; general color of underparts gray instead of buffy brown, breast darker gray; in some specimens white and buffy areas on forehead, chin, and throat much more extensive.

Measurements.—

Male (20)	Female (12)
Wing, 138-155 (146.2)	Wing, 129.9-142.6 (134.8)
Tail, 113-149 (131.6)	Tail, 107.8-124.1 (118.6)
Tarsus, 48.8-54 (51.7)	Tarsus, 49.0-55.5 (50.9)
Culmen from base, 18.7-20.8 (19.7)	Culmen from base, 17.6-19.2 (18.4)

General Distribution.—Resident from the Pacific Cordillera of Guatemala, through the higher mountains of El Salvador, and Honduras to northern Nicaragua.

Distribution in Guatemala.—Resident in the woodlands of the Pacific slope, from elevations of about 1,000 feet in the Tropical Zone to above 9,000 feet in the Temperate Zone.

Records.—This race was recorded near Patulul, April 8, 1946, and Finca Helvetia, April 10-14, 1947. It was reported by local hunters near Escuintla and Encuentros, Escuintla.

In literature it has been recorded for: Dueñas, Panajachel, Sololá (Salvin and Godman); Volcán San Lucas and Tecpám (Griscom); Sierra Santa Elena near Tecpán (Wetmore).

Habits and Hunting.—See the notes for the preceding subspecies.

30. Colinus virginianus insignis Nelson

Guatemalan Bobwhite

Other Names.—

Guatemalan: codorniz, perdiz
English: quail, bobwhite

Status.—The Guatemalan bobwhite is a resident of the grassy highlands near Nentón. No data are available regarding its relative abundance.

Description.—Larger than C. v. minor; male with black head and brown body; female with buffy chin and throat, spotted brown body.

Adult male.—Upperparts similar to C. v. minor in coloration; chin and throat are blackish or blackish brown, either uniformly colored or spotted with white; a white stripe above and behind the eye; sides of head and neck black; abdomen plain hazel brown.

Adult female.—Chin and throat buffy; buffy line back of eye; pale edges of crown feathers brownish rather than gray; upper parts rufous brown to dark brown; breast slightly tinged with cinnamon brown; underparts buffy white and brown, with spotted appearance.

Measurements.—

Male (20)	Female (20)
Wing, 98-108 (101.8)	Wing, 93-103 (98.9)
Tail, 54.5-64 (57.8)	Tail, 51-58.5 (54.2)
Tarsus, 27.8-30.8 (28.9)	Tarsus, 27.4-30.2 (28.4)
Culmen from base, 14.7-16.3 (15.4)	Culmen from base, 14.4-16.2 (15.2)

General Distribution.—Comitán Valley in eastern Chiapas and in the adjacent part of western Guatemala.

Distribution in Guatemala.—The western highlands near Chiapas, at elevations from 3,000 to 6,000 feet, Subtropical Zone.

Records.—This species was not observed during our survey.

In literature it has been recorded only from Nentón (Nelson).

Habits and Hunting.—See the general comments on quail, and those under C. leucopogon hypoleucus.

31. Colinus nigrogularis nigrogularis (Gould)

Honduras Bobwhite

Other Names.--
Guatemalan: perdiz, codorniz
English: quail

Status.--This species is reported to be a fairly common resident of the grasslands, especially on the savannas near La Libertad and San Francisco, El Petén.

Description.--Size about the same as that of C. virginianus subsp.

Adult male.--Chin and throat black; crown brownish black, bordered at front and sides by a broad stripe of brownish white; interscapulars chestnut; breast white, the feathers broadly edged with black, giving it a white-spotted pattern. Bill black, feet and legs dark brown.

Adult female.--Chin and upper throat light buffy brown; crown brownish black streaked with grayish buff; upperparts mostly mottled, spotted, and barred with black and buff on light brown; abdomen whitish more or less transversely barred or spotted with brownish black; the sides and flanks with broad V-shaped markings. Bill brownish black, basal half of lower part light colored; feet and legs dark brown.

Measurements.--

Male (4)	Female (7)
Wing, 92-94 (93)	Wing, 86-95 (92)
Tail, 49.5-52.5 (51.)	Tail, 48-51 (48.8)
Tarsus, 27.7-28.1 (27.9)	Tarsus, 26.4-28.5 (27.7)
Culmen from base, 14.5-15.2 (14.8)	Culmen from base, 14.4-15.7 (14.8)

General Distribution.--Lake Petén district of Guatemala, the open pine-forested parts of Belize (British Honduras), and the Caribbean lowlands of Honduras (and northern Nicaragua?).

Distribution in Guatemala.--Tropical Zone grasslands of the northern Petén.

Records.--It was reported by local hunters to occur near La Libertad and San Francisco, Petén.

In literature it has been recorded from: Pacomón and La Libertad (Van Tyne); La Libertad (Nelson).

Habits and Hunting.--See the general comments on quail.

32. Colinus leucopogon hypoleucus (Gould)

Salvadorean White-breasted Bobwhite

Other Names.--
Guatemalan: codorniz, perdiz, coroniz
English: quail, bobwhite

Status.--This quail is a common resident locally of grasslands near the El Salvador boundary, in the Department of Jutiapa.

Description.--A small quail; male with chin, throat, and underparts mostly white; female browner, more barred and spotted on underparts.

Adult male.--Forehead brown, nape and occiput with large white spots; back and rump brown heavily blotched with blackish and flecked with grayish white; scapulars and upper wing coverts reddish-brown; chin and throat white, some individuals with almost the entire underparts white, while in others this is true of only the breast and upper abdomen. Bill black; iris dark brown; feet and legs bluish horn.

Adult female.--Similar to male on the upperparts, but differing beneath in that the chin and throat are pale buff, slightly streaked with dusky; rest of underparts strongly barred with dark brown and blackish.

Measurements.--

Male (12)	Female (2)
Wing, 97.5-103.3 (100.1)	Wing, 95.9-102.1
Tail, 53.1-60.8 (57.2)	Tail, 54.4-58.1
Tarsus, 27.3-29.3 (28.5)	Tarsus, 27.4-29.2
Culmen from base, 14.5-16.0 (15.1)	Culmen from base, 14.7-15.0

General Distribution.--Western Guatemala and El Salvador west of the Lempa River.

Distribution in Guatemala.--The southeastern part of the Republic adjacent to the Departments of Santa Ana and Ahuachapán, El Salvador, Arid Tropical Zone.

Records.--Asunción Mita, Mongoy and Lake Atescatempa, April 25-27, 1946; Lake Atescatempa, April 18-20, 1947. Quail believed to be of this species were heard calling near Lake Amatitlán, March 16, 1947.

It was reported by local hunters to occur near Lake Guija, Progreso, and Monjas in the Department of Jutiapa.

In literature it has been listed only for El Salvador, but recorded as near Guatemala as Acajutla (Salvin and Godman); Volcán Santa Ana and Lake Guija (Dickey and van Rossem). Griscom's records of this form for the Montagua Valley are referable to the following race, C. l. incanus.

Habits and Hunting.--Dickey and van Rossem wrote of this quail in western El Salvador, "Laying evidently does not commence before about the end of May, for flocks are the rule up to that time. Although the young of the year are normally fully feathered by the latter part of September and most of the birds are by that time again gathered into flocks, a few continue to nest until well along in the fall, for a half-grown juvenile was taken at Colima . . . January 21." Their calls are similar to those of our bobwhites of the United States. On April 25-27, 1946, near Lake Atescatempa and Asunción Mita, these quail were often heard giving their bobwhite calls from nearby grassy hills. Because of the open nature of their environment they can be hunted fairly successfully without dogs, but the use of dogs is preferable.

33. Colinus leucopogon incanus Friedmann

Guatemalan White-breasted Bobwhite

Other Names.--

Guatemalan: codorniz, perdiz
English: quail, bobwhite

Status.--This subspecies is reported to be a common resident in many parts of its range.

Description.--

Adult male.--Similar to C. l. hypoleucus but slightly paler above; the scapulars and upper wing coverts only slightly reddish brown.

Adult female.--Similar to C. l. hypoleucus but paler, especially above.

Measurements.--

Male (3)	Female (4)
Wing, 99.4-105.1 (102.6)	Wing, 97.1-101.1 (98.7)
Tail, 59.7-63.2 (61.7)	Tail, 53.1-62.7 (57.6)
Tarsus, 28.1	Tarsus, 27.1-28.4 (27.7)
Culmen from base, 14.4-15.0 (14.8)	Culmen from base, 14.1-14.8 (14.4)

General Distribution.--Parts of Guatemala.

Distribution in Guatemala.--Arid Tropical Zone of southeastern Guatemala, from the Upper Motagua Valley to the Departments of Baja Vera Paz and Jalapa.

Records.--Quail believed to be of this form were observed in the Motagua Valley at the following localities: Trujillo, May 6, 1947; Cabañas, May 8, 1947; Progreso and Sanarate, May 9, 1947. Many observed near Salamá, May 14, and one near Rabinal, May 19, 1947, were also probably of this race.

In literature it is recorded from: Progreso, and Anthony observed it "in other parts of the arid portion of the Río Motagua Valley" (Griscom).

Habits and Hunting.--See the general comments on quail and the notes under the preceding subspecies.

34. Odontophorus guttatus (Gould)

Spotted Wood Quail

Other Names.--
Guatemalan: coloquin; ah bolon chaco or coban chaco (Maya)
English: wood quail

Status.--This species is reported to be a fairly common local resident of the dense rain forest.

Description.--A large quail (wing about 127-158 mm.), stoutly built, with short tail, heavy bill, and more or less conspicuous bushy crest, especially when erected; brown neck and breast spotted conspicuously with white, throat black streaked with white. Sexes similar.

Adult male.--Forehead front of crown, and around eye dark brown; an area of bare skin around the eye; crest in front of blackish tipped with brown, in back and laterally bright orange buff; scapulars and upper back largely blotched with black; back and rump pale brown flecked with black; tail feathers dark brown. Marked on the edges with paler brown; chin and throat black, each feather with a white shaft streak; sides of neck, breast, sides, and fore part of abdomen brown to dark brownish gray, the feathers with white shaft streaks and subterminal spots. Bill black; iris dark brown; feet and legs lead colored.

This description is of the olive-brown phase. Another phase occurs in which the plumage is more reddish brown.

Adult female.--Similar to the male of the same phase, but smaller; the entire crest brown; the upper parts usually slightly more reddish brown. Coloration of soft parts as in the male.

Measurements.--

Male (35)	Female (16)
Wing, 134-153.5 (143.8)	Wing, 134.5-148.5 (139.8)
Tail, 69.5-76.5 (62.2)	Tail, 61-72.5 (67.0)
Tarsus, 41.5-48.9 (45.6)	Tarsus, 41.5-47 (43.9)
Culmen from base, 19.3-22.6 (19.4)	Culmen from base, 18.2-21.0 (19.7)

General Distribution.--Southern México from Vera Cruz and Oaxaca south to Veraguas.

Distribution in Guatemala.--Humid Tropical and Subtropical Zones, from about 1600 feet to above 6,000 feet.

Records.--This species was not obtained by us during the survey.

In literature it has been reported from: Vera Paz, Dueñas, Volcán de Fuego, Volcán de Agua (Salvin and Godman); Secanquim (Griscom); Uaxactún (Van Tyne).

Habits and Hunting.--No specific information.

35. Dactylortyx thoracicus chiapensis Nelson

Chiapan Long-toed Quail

Other Names.--
Guatemalan: coloween, perdiz
English: partridge

Status.--This species is reported to be a common but local resident of the subtropical cloud forest.

Description.--A medium-sized, very short-tailed, long-toed, crested quail; bill small and slender; middle toe and claw longer than tarsus. Sexes fairly similar in coloration, the male with a cinnamon brown throat and gray breast streaked with white, the female with grayish throat and brown breast.

Adult male.--Crest, bushy when erected, dark brown, its lateral feathers with buff shaft streaks. A line above eye, cheek, chin, and throat cinnamon brown; breast, sides, and flanks light brownish gray, broadly streaked with whitish, abdomen whitish; upperparts finely mottled brown and gray; hindneck streaked with buff and dark brown; scapulars and tertiaries with large black spots on inner webs. Bill blackish-brown, iris brown, feet and legs grayish horn.

Adult female.--The cinnamon coloration of the male replaced by grayish white; the breast hazel brown or paler.

Immature.--Differs from the adult in having the throat whitish; chest, breast, and sides vinaceous; a few of the chest feathers barred with black.

Measurements.--

Male (10)	Female (6)
Wing, 123-137 (133)	Wing, 125-133 (128.2)
Tail, 51-56.5 (53.7)	Tail, 49-53.5 (51.3)
Tarsus, 34.3-37.4 (35.9)	Tarsus, 32-34.3 (33.5)
Culmen from base, 16.8-17.8 (17.3)	Culmen from base, 16-16.8 (16.4)

General Distribution.--Central Chiapas, south through western Guatemala.

Distribution in Guatemala.--Cloud forests of the Pacific Cordillera, chiefly at elevations from 7,000 to 8,500 feet.

Records.--Near Patzún, May 3, 1946; near Nebaj, April 25-26, 1947. Two large quail, probably of this species, were flushed near Chemal, Huehuetenango, May 1-2, 1947. It was reported by local hunters to occur near Tecpán, Nebaj, Chajul, and Cotzal.

In literature it has been recorded from: Volcán de Santa María (Nelson); Volcán de Fuego, Quetzaltenango, Dueñas (Salvin and Godman); Tecpán, Quetzaltenango, Volcán San Lucas, Finca La Perla, forty miles northeast of Barrillos (Griscom).

Habits and Hunting.--This shy, wary quail is a denizen of the cloud forest of the Pacific cordillera, where it is usually to be found among dense vegetation. It is reported to venture forth into some of the adjacent coffee groves, especially during the months of September or October through January, at which season it is apt to be in flocks.

Those we saw and heard were in the heavy cloud forest above Finca Helvetia at an elevation of 5,000 feet and higher. They were probably nesting at that time.

We obtained no field information on the nesting of this species but reports indicated that it breeds in April and May, and probably later.

Only one of these birds was flushed in the cloud forest above Finca Helvetia, the others escaped by darting through the concealing undergrowth. This seems to be characteristic of them, which gives the hunter much less opportunity for a shot.

Griscom wrote, "This little-known quail is a typical cloud-forest species of the Pacific cordillera, and most of the specimens have been taken from 7,000 to 8,500 feet. Salvin found it to be one of the commonest quail on the Volcán de Fuego, and shot most of his specimens on the ground, as the bird preferred to escape by sitting close or running, rather than taking wing. The immature bird is quite different from the adult in having a whitish throat, the chest, breast, and sides a warm vinaceous, gradually passing to whitish on the abdomen. A few of the chest feathers have black bars."

Anthony was quoted by Griscom as follows, "A more or less common bird of the forests, seldom venturing into the open. Along the deep shaded trails in the rain forest of Volcán San Lucas one constantly finds where flocks of these quail have 'dusted' in the damp leaves, leaving rounded depressions such as are made by barnyard fowls in the dry earth. The birds are so dark in color that they blend into the color scheme of the semi-dark forest and dead leaves, making it very difficult to see them until they take wing, whisk around the shoulder of the hill, and are lost. Several flocks of ten or a dozen were seen above Tecpán, in the heavy oak and pine forest.

"At Finca Perla, two of these birds were kept in separate cages on different sides of the house. I was told that it was for the sake of their 'song', which they would sing in the early morning, but that there would be no song, if the birds could see each other. I had often listened to the calls of this quail, from the edge of the forest, and

wondered at its mellow richness, reminiscent of the flute-like call of the Plumed Partridge of the Sierra Nevadas. I was not, however, expecting a duet, such as I witnessed several times at this place. In the early morning, when the calls were most frequent on the mountain sides, one of the cage birds would utter its invitation, 'cua-cua-cua,' at intervals of two or three seconds. Soon the second bird responded, 'cua-kaka-wak-cua-kaka-wak'; while the other joined in perfectly in time and tone, 'cua-cua-cua,' both continuing for some twenty or thirty seconds and stopping in exact unison. It seems hard to believe that two birds were calling, so perfect was the time and tone. I am unable to say whether the birds were of the same sex or not, the plumage was so worn and broken."

The calls and songs of Dactylortyx seemed more musical and less loud than those of Dendrortyx. In the forest above Finca Helvetia they were heard at least once each morning, but much less frequently than was the guachoco.

In El Salvador, on parts of Mt. Cacaguatique, it was found that with the clearing of the original forest cover and the development of coffee groves, these quail have come to prefer these groves to their natural habitat of oak scrub (Dickey and van Rossem).

36. Cyrtonyx ocellatus ocellatus (Gould)

Ocellated Harlequin Quail

Other Names.--
Guatemalan: codorniz careta, codorniz pintada, perdiz
English: spotted quail, quail, mountain quail

Status.--This harlequin quail is a common resident within its range except where it has been reduced in numbers by local conditions.

Description.--A medium-sized, very short-tailed quail; conspicuous crest of soft, broad, decurved feathers; sides and flanks strikingly spotted. Sexes different in coloration; the male conspicuously colored, face marked with alternate white and blackish lines and patches, throat black bordered by white underparts rich brown centrally, gray with round buff spots on sides, wings gray with black spots; the female much plainer, head grayish brown, streaked, the underparts pale purplish brown with black spots.

Adult male.--Head contrastingly banded with black and white; crown blackish, bordered broadly with white; occiput brown, nape gray with large rounded buffy spots; band around eye, ear area, and stripe to breast white; the white band across lower throat and breast posteriorly margined with black; back and rump gray, feathers with buff shaft streaks; breast and upper abdomen pale buff, darker and richer brown posteriorly; sides of neck and of breast dark gray conspicuously spotted with buff; sides of upper abdomen with larger, pale tawny spots; more chestnut on flanks with gray largely replaced by black; middle of lower abdomen, vent, undertail coverts and thighs black. Bill black with pale blue rami; iris dark brown; legs and feet light blue.

Adult female.--Head mostly brown, without conspicuous black or any white; back brown streaked with buff, barred with black; underparts pale cinnamon with a few blackish markings. Soft parts colored as in the male.

Measurements.--

Male (15)	Female (9)
Wing, 114-130 (123.2)	Wing, 110.5-119.5 (115.7)
Tail, 48-57.5 (53)	Tail, 45-55.5 (48.8)
Tarsus, 30.4-33.2 (32.1)	Tarsus, 28.9-32.0 (30.9)
Culmen from base, 15.1-17.5 (16.1)	Culmen from base, 15.1-16.7 (15.6)

General Distribution.--Southwestern México, from Oaxaca through western Guatemala.

Distribution in Guatemala.--Central highlands east of the Pacific divide, at elevations from 4,500 to 7,000 feet.

Records.--Chimaltenango, March 2, 1946; San Juan Sacatepequez, May 12, 1946; Panajachel, March 5, 1942; Sololá, March 5, 1942; San Pedro Jocopilas, April 22, 1947; Nebaj, April 25, 1947. Quail probably of this species were also observed at the following localities: Chiul, on route 3 southeast of Nebaj; on a mountainside above Sacapulas, enroute Nebaj, at 6,400 feet elevation; near Cotzal, April 29, 1947.

In literature this species has been recorded from: Quetzaltenango, Dueñas, Tolimán at 5,000 feet (Salvin and Godman); Tecpán (Dearborn); Antigua, Nebaj, San Antonio,

Panajachel, San Lucas, Joyabaj, Chichicastenango, Totnicapán, Momostenango, Volcán de Agua (Griscom).

Habits and Hunting.--The drier country of the central highlands is the home of the ocellated quail. It is found on the grassy slopes, in the fields, and in open woodland from about 5,000 to 10,000 feet.

Our first view of these beautiful birds was on the open pine slopes near Chimaltenango, where several were flushed within sight of the nearby grain fields. Others were observed on May 12, 1946, near San Juan Sacatepequez on a brushy and bracken covered slope of open woodland.

Anthony (Griscom) found small flocks among the weeds in abandoned cornfields on the slopes of Volcán de Agua. He also observed them in grassy areas on the ridges between Chichicastenango and Totonicapán at about 10,000 feet and in open pine forest near Momostenango.

They are reported to occur in many localities near the capital, chiefly in or near small areas of cornfields and adjacent open pine woodland, but relatively few in numbers.

Perhaps the first characteristic of these quail noticed by the hunter is that of lying so close that they are almost stepped upon before they flush. After they take wing they often fly some distance before alighting, especially if in open fields; then they are apt to run through the grass, which adds to the difficulty of relocating them.

Regarding the habits of these quail at 6,400 to 7,000 feet in El Salvador, during February and March, Dickey and van Rossem commented that "three small flocks of a dozen or so birds each were known to live within a radius of a mile. It is not improbable that these flocks were family groups which had remained together after the preceding breeding season, for at least some of the members had not, in late February and early March, fully completed the postjuvenal molt." Resident hunters reported that the nesting season is from April to August. By September the birds are in coveys.

A number of sportsmen in Guatemala are especially interested in quail hunting, and because of the proximity of this species to the capital, are particularly concerned with its increasing scarcity. Most of their quail shooting is done in nearby localities; the vicinities from Zumpango to Chimaltenango, Antigua, and San Juan Sacatepequez are favorite hunting grounds.

It was reported by local hunters that the quail population has decreased greatly in recent years. Ten years ago a bag of about fifteen birds was considered good, they said, but now a bag of five probably is about average.

The reductions in the population and in hunting success are attributed to the much greater extent of clearing and farming, increased hunting pressure, and extensive trapping. Much of the hunting pressure is blamed on the "escopeta negra," as the market hunter is called. Trapping on many farms by the use of simple traps such as the "figure four," and by snares is reported to account for many birds. The common snare is called alzapie, nets are redes, and the method of driving birds is termed el arreo.

"This partridge is easily shot over a dog, but after trying the sport with a dog of good blood, I concluded I would rather feed him on some other food and went home. The dog, however, could have eaten several more birds, had I been willing." (Griscom, quoting Anthony.)

37. Agriocharis ocellata (Cuvier)

Ocellated Turkey

Other Names.--

Guatemalan: pavo, pajuil, ucutz ilchican (Maya)
English: Petén turkey, spotted turkey, turkey

Status.--This turkey is reported to be a common resident locally, though generally scarce in numbers.

Description.--A large bird closely resembling our wild turkey (Meleagris), but differing in having, in the adult male, an erect, cylindrical knob on top of the head, a more rounded tail, and more brilliantly metallic coloration, and in lacking the throat beard. Head and upper neck bare and covered with scattered wart-like excrescences, the adult male with a soft, fleshy appendage dependent from the front of the forehead.

Adult male.--Brilliant metallic green with iridescence of golden and blue; the greater wing coverts brilliant coppery bronze; feathers of the upper tail coverts and tail with subterminal band or eye-spot of coppery bronze and tip of the same color; secondaries broadly white on outer vanes; skin of head and neck bright blue, wart-like excrescences orange or orange-red; bill dull red; iris dark brown; legs and feet red.

Adult female.--Similar to adult male but smaller and less brilliant in coloration; eye-spots on the tail feathers smaller; and knob on crown reduced. Soft parts colored as in male.

Measurements.--

Male (8)	Female (6)
Wing, 348-412.5 (388.5)	Wing, 313-357 (339.7)
Tail, 284-347 (327.9)	Tail, 244-281.5 (262.5)
Tarsus, 131-139.4 (136.2)	Tarsus, 109.0-115 (112.6)
Culmen from cere, 25-31.8 (28.5)	Culmen from cere, 21-29.8 (24.3)

General Distribution.--Yucatán Peninsula and adjacent parts of Guatemala and Belize (British Honduras).

Distribution in Guatemala.--Tropical forests of the Petén.

Records.--It was reported by local hunters to occur near La Libertad, San Francisco, Lake Petén, and Sayaxché.

In literature it has been recorded from: Yaxa (Lantz), Uaxactún, Pacomón, and Dos Arroyos (Van Tyne).

Habits and Hunting.--This species is much sought after by hunters, who consider it a very fine game bird. Its wariness and limited numbers are reported to add greatly to the difficulty of shooting it.

Statements of hunters indicate that the ocellated turkey is most apt to be found at those grain fields where they come to feed, or on trails at the edge of woodland adjacent to the savannas.

38. Aramus scolopaceus dolosus Peters

Central American Limpkin

Other Names.--
None known.

Status.--This resident species is apparently rare in the Republic.

Description.--A large brown marsh bird about the size of a bittern or night heron, with a very long, slightly decurved bill, a long neck, and long dark legs; general coloration is dark brown, streaked and spotted with white. In flight the large wings and slow steady wing strokes, made with an upward jerk, with legs trailing beyond tail are diagnostic characteristics. The sexes are alike in coloration.

Voice.--Mournful wailing notes, cur-e-ow, usually in slow series, often at night.

Measurements.--

Male (6)	Female (3)
Wing, 310-330 (319.5)	Wing, 300-305 (303)
Tail, 138-158 (144.3)	Tail, 134-138 (136)
Tarsus, 117-142 (128)	Tarsus, 115-121 (119)
Culmen, 106-125 (117.7)	Culmen, 108-118 (113)

General Distribution.--Eastern and western slopes of southern México and Central America, south to Panama.

Distribution in Guatemala.--Observed only in the marshes adjacent to the Chiquimulilla Canal, east of Iztapa, and at Uaxactún in Petén.

Records.--Near Jicaro, in the marshes adjacent to Chiquimulilla Canal.
In literature this species has been recorded only from Uaxactún, Petén (Van Tyne).

Habits and Hunting.--This species is too rare in the Republic to be of value as a game bird.

39. Rallus limicola limicola Vieillot

Virginia Rail

Other Names.--
None known.

Status.--This migrant rail may be fairly common locally, though relatively few in numbers.

Description.--A small rail, slightly smaller than a quail, reddish brown in color and with a long, slightly decurved bill; wing coverts reddish; flanks dark, barred with white.

Voice.--A variety of calls, commonly cut, cut, cutta, usually in series.

Measurements.--

Male (26)	Female (19)
Wing, 94-113 (105.9)	Wing, 95-105.5 (101.2)
Tail, 38.5-54 (44.3)	Tail, 38-47.5 (45.0)
Tarsus, 31.5-39 (35.4)	Tarsus, 31-37.5 (34.1)
Culmen, 36.5-44.5 (41.7)	Culmen, 36-42.5 (40.2)

General Distribution.--Breeds from Saskatchewan, southern Manitoba, southern Ontario, southern Quebec, New Brunswick and Nova Scotia, south to Colorado, Nebraska, Missouri, southern Illinois, Ohio, New Jersey, and eastern North Carolina; also in the Valley of México. Winters in the lower Mississippi Valley; from North Carolina to Florida, and in eastern México south to Guatemala.

Distribution in Guatemala.--Recorded only at three localities in the central highlands near Guatemala City and Antigua during September and October. Probably occurs in rice fields of the Pacific coastal plain.

Records.--This species was not observed during our survey.
In literature it has been recorded from: Dueñas, Antigua, and Ciudad Vieja, only in September and October (Salvin and Godman).

Habits and Hunting.--This species is too scarce in the Republic to be of importance as a game bird.

40. Amaurolimnas concolor guatemalensis (Lawrence)

Guatemalan Uniform Crake

Other Names.--
None known.

Status.--There is no recent information to indicate whether this rare rail still occurs in the Republic.

Description.--A medium-sized rail (wing about 120 mm.) dark brown in coloration. Sexes alike.

Adults.--Head rich brown; upper parts mostly olive brown, more rufescent on the rump, upper tail coverts and tail feathers; chin and throat pale; breast and underparts tawny to hazel brown; bill yellowish-green, blackish above; iris red; legs and feet reddish.

Measurements.--

Male (10)	Female (6)
Wing, 116-125 (119.4)	Wing, 110-122 (115.5)
Tail, 44-52 (47.8)	Tail, 44.5-47 (45.7)
Tarsus, 38.5-44.5 (41)	Tarsus, 37-43.5 (40.9)
Exposed culmen, 23.5-26.5 (26.6)	Exposed culmen, 23-26 (24.7)

General Distribution.--Occurs locally from Guatemala south to Ecuador, Matto Grosso, and Sao Paulo.

Distribution in Guatemala.--Only one record, no specific locality given.

Records.--This species was not observed during the survey.
In literature there is only one record and that is of a specimen labeled "Guatemala," with no specific locality given (Salvin and Godman).

Habits and Hunting.--This species is too rare in occurrence within the Republic to be of value as a game bird.

41. Aramides cajanea albiventris Lawrence

White-bellied Wood Rail

Other Names.--
None known.

Status.--This rail is reported to be a fairly common resident in some localities.

Description.--A very large rail (wing about 185 mm.) with bill longer than head but shorter than leg; nape brown, neck gray, back plain greenish olive. Sexes alike in coloration.
Adults.--Forehead, crown, and hind neck gray; back greenish, olive brown, some specimens with a cinnamon suffusion across the upper back; rump, upper tail coverts, tail feathers, flanks, middle of lower abdomen, vent, and under tail coverts black; chin and throat white; sides of neck and upper breast gray; lower breast, upper abdomen, sides, and wing feathers cinnamon; the posterior edge of the brown upper abdomen broadly white, which forms a conspicuous band between the brown and black; thighs gray. Bill reddish basally, greenish terminally; iris red; feet and legs red.

Measurements.--

Male (3)	Female (4)
Wing, 182-189 (185.8)	Wing, 172-195.5 (183.9)
Tail, 60-66 (62.8)	Tail, 60-66 (62.7)
Tarsus, 79.5-82 (80.5)	Tarsus, 73-81 (77.4)
Exposed culmen, 64-65 (64.3)	Exposed culmen, 58.5-64.5 (61.1)

General Distribution.--Yucatán Peninsula, Cozumel Island, Belize (British Honduras), and adjacent parts of Guatemala.

Distribution in Guatemala.--Resident in lowland tropical forests of the Petén and Alta Vera Paz.

Records.--Panzós, May 17, 1947.
In literature it has been recorded from: Choctum (Salvin and Godman); Uaxactún and Chuntuquí (Van Tyne).

Habits and Hunting.--This large rail should be looked for in the forest pools, swamps, and marshes of its range. It is reported to be few in numbers and wary in habit.

42. Aramides cajanea vanrossemi Dickey

El Salvador Wood Rail.

Other Names.--
None known.

Status.--This wood rail is apparently fairly common locally in coastal swamps and ponds.

Description.--Similar to A. c. albiventris but larger (wing about 192 mm.)

Measurements.--

Male (2)	Female (1)
Wing, 189-195	Wing, 190
Tail, 60.5-70	Tail, 60
Tarsus, 83-86	Tarsus, 84
Exposed culmen, 68	Exposed culmen, 63

General Distribution.--Pacific coast of Guatemala, and extreme western Salvador.

Distribution in Guatemala.--Pacific coastal plain, chiefly in mangrove jungles and adjacent marshes.

Records.--Near San José, February 28, 1946; Tiquisate, April 12, 1946.
In literature it has been recorded from: Retalhuleu (Sharpe, Cat. Birds Brit. Mus., 23, p. 59); San José (Lantz, 1899:219); Chiapam (Bangs, 1907:184); Ocós (Griscom); mouth of the Río Samalá (Salvin and Godman).

Habits and Hunting.--This rail is reported to be seen in swamps and marshes of the Pacific Coast where some of the duck hunting is done. Like the other rails, it is said to be scarce and wary; and of relatively little importance as a game bird.

43. Porzana carolina (Linnaeus)

Sora Rail

Other Names.--
None known.

Status.--This species is probably a fairly common migrant and winter resident in fresh-water marshes, especially those of larger size.

Description.--A small rail, about the same size as the Virginia, but much grayer, with a short, stubby yellow bill and black on its face and throat; brown above, gray below, with barring on flanks.

Voice.--Usually a sharp kik, kik.

Measurements.--

Male (60)	Female (22)
Wing, 100-116.5 (107)	Wing, 98.5-109 (101.5)
Tail, 42-54 (48)	Tail, 38-49 (44)
Tarsus, 28.5-36.5 (32.5)	Tarsus, 27-32.5 (30.5)
Exposed culmen, 17-24.5 (20)	Exposed culmen, 17.5-22 (19.5)

General Distribution.--Breeds from central British Columbia, southern Mackenzie, Manitoba, lower St. Lawrence Valley and Nova Scotia, south to northern Lower California, Utah, northern Missouri, southern Ohio, and Maryland. Winters from California, Arizona, Texas, and Florida, south to Peru, Venezuela, and the West Indies.

Distribution in Guatemala.--Recorded at several localities in the highlands and in marshes adjacent to the Chiquimulilla Canal; probably occurs regularly in winter in marshes of the Pacific coastal plain.

Records.--This species was not observed during the survey.
In literature it has been recorded from: Vera Paz, Dueñas, and Cobán (Salvin and Godman); Amatitlán, Atitlán (Dearborn).

Habits and Hunting.--This rail is too small and scarce to be of value as a game bird in Guatemala.

44. Laterallus jamaicensis pygmaeus (Blackwall)

Eastern Black Rail

Other Names.--
None known.

Status.--This black rail is apparently a rare migrant to freshwater marshes of the Republic.

Description.--A tiny slate-colored rail about the size of a sparrow; nape and back chestnut brown, rest of plumage dark with some white spots above, white bars on flanks; iris red, legs yellowish green, bill black.

Measurements.--

Male (8)	Female (3)
Wing, 70-75.5 (72.5)	Wing, 73.5-77 (75)
Tail, 29-34.5 (32.1)	Tail, 30
Tarsus, 21-23 (22.2)	Tarsus, 20-24 (22.5)
Exposed culmen, 12-15 (14.1)	Exposed culmen, 13.5-14 (13.7)

General Distribution.--Breeds from Minnesota, southern Ontario (?), and Massachusetts, south to Kansas, Illinois, and Florida. Winters mainly south of the United States.

Distribution in Guatemala.--Only one record, that at Dueñas.

Records.--This rail was not observed during our survey.
In literature it is recorded only at Dueñas (Salvin and Godman)

Habits and Hunting.--This rail is too small to be of any value as a game bird.

45. Laterallus ruber ruber (Sclater and Salvin)

Guatemalan Ruddy Rail

Other Names.--
None known.

Status.--This species is apparently a regular migrant, as well as a resident in some localities, though generally scarce in numbers.

Description.--Very small, not much larger than a sparrow; head gray; underparts chestnut brown, palest on chin; back brown, rich chestnut on upper back, darker on rump, upper tail coverts blackish; wings olive brown. Sexes similar in coloration.

Measurements.--

Male (12)	Female (6)
Wing, 73.5-84.5 (78.1)	Wing, 70.5-80 (76.3)
Tail, 28-36 (31.2)	Tail, 27-32.5 (30.3)
Tarsus, 30.5-35 (32.6)	Tarsus, 29-32 (30.8)
Exposed culmen, 18-21.5 (20.2)	Exposed culmen, 17.5-21.5 (19.6)

General Distribution.--Yucatán Peninsula, Guatemala, and Belize (British Honduras) to northern Honduras; Cozumel Island.

Distribution in Guatemala.--Tropical Zone marshes of the Petén, Alta Vera Paz, and eastern lowlands. Recorded also at Lake Amatitlán and Dueñas.

Records.--This species was not observed during the present survey.
In literature it has been recorded from: Vera Paz, Cobán, Choctum, Dueñas (Salvin and Godman); Secanquim, Chamá, Finca Concepción, Chimoxán, Quiriguá (Griscom); Pacomón, Laguna del Zotz (Van Tyne); Laguna Perdida and Lake Amatitlán (Ridgway and Friedmann, 1941:185).

Habits and Hunting.--This rail is too small to be of any value as a game bird.

46. Gallinula chloropus cachinnans Bangs

Florida Gallinule

Other Names.--
Guatemalan: gallina de agua
English: marsh hen, water hen

Status.--This species is a fairly common migrant and winter resident at freshwater marshes and lagoons.

Description.--A grayish coot-like marsh bird with a red bill; white edging to feathers of flanks; back and wings brownish; frontal shield on forehead red; red bill tipped with yellow; eye dark; greenish legs.

Voice.--A variety of notes, commonly similar to the clucks and squawks of a domestic hen.

Measurements.--

Male (16)	Female (10)
Wing, 167-181 (174.5)	Wing, 151.5-174 (164.2)
Tail, 64-86 (72.2)	Tail, 62-71 (66)
Tarsus, 49-57 (52.7)	Tarsus, 45-51 (48.5)
Culmen from frontal shield, 38.5-47.5 (43.2)	Culmen from frontal shield, 36-42.5 (39.9)

General Distribution.--Breeds from central California, Arizona, Nebraska, Minnesota, southern Ontario, New York, and Vermont, south to southern Lower California, México (and locally to Panamá), the Gulf coast and Florida; Bermuda, Galapagos Islands. Migratory in the northern part of its range.

Distribution in Guatemala.--Winter visitant to freshwater marshes of the Pacific coastal plain; also recorded at Lake Amatitlán and Dueñas.

Records.--Lake Amatitlán, March 1942; Lake Atescatempa, January 29, 1947; marshes adjacent to the Chiquimulilla Canal, January 29, 1947.

In literature it has been recorded from: Dueñas (Salvin and Godman); Amatitlán (Dearborn).

Habits and Hunting.--This species is found in much the same environment as is the coot, and is similar in many habits.

As the coot is so much more numerous by comparison, it is usually much easier for the hunter to shoot a fair bag of them before he sees his first gallinule. All reports indicate the latter is of very little value as a game bird in the Republic.

47. Porphyrula martinica (Linnaeus)

Purple Gallinule

Other Names.--
None known.

Status.--This species is apparently an uncommon and very local migrant to and resident of freshwater marshes and lagoons.

Description.--A coot-like bird with a dusky red bill, purple head and underparts; back glossy olive-green; frontal shield on forehead blue; legs yellow. Colors of soft parts brighter in breeding season, red bill then tipped with yellow.

Measurements.--

Male (19)	Female (27)
Wing, 168-184 (176.2)	Wing, 161-184 (170.8)
Tail, 60-78 (69.7)	Tail, 60-78 (68.2)
Tarsus, 56-64 (60.8)	Tarsus, 52-65 (59.3)
Culmen from nostril, 16-19 (17.5)	Culmen from nostril, 15-19 (16.8)

General Distribution.--Breeds from Texas, Louisiana, southern Alabama, and South Carolina south through México and the West Indies to Peru, northern and eastern Argentina, and Río Grande do Sul. Migratory in the northern part of its range in the United States.

Distribution in Guatemala.--Lagoons and marshes of Petén and the Departments of Vera Paz.

Records.--Lake Petén, January 30, 1947.

In literature it has been recorded from: lagoons near Lake Petén and from Vera Paz (Salvin and Godman); Uaxactún, Flores (Van Tyne).

Habits and Hunting.--Similar to the preceding species, but apparently very few in numbers.

48. Fulica americana americana Gmelin

American Coot

Other Names.--

Guatemalan: gallareta, gallina de agua
English: mudhen, waterhen

Status.--The coot breeds at some localities in Guatemala, but is most common as a winter resident, due to the influx of migrants from farther north.

Description.--A grayish black, duck-like bird with an ivory white, chicken-like bill and lobed toes; iris red; outer under tail coverts white. In flight the white border to the hind edge of the wing is conspicuous.

Voice.--A variety of calls, often loud; cuk, cuk in series, also pulque, pulque.

Measurements.--

Male (31)	Female (26)
Wing, 174-202 (190.3)	Wing, 171-192 (179.3)
Tail, 44.5-61 (51.4)	Tail, 41-55 (49.0)
Tarsus, 51-61.5 (56.0)	Tarsus, 44-58.5 (53.0)
Culmen from nostril, 13-16 (14.2)	Culmen from nostril, 13-16 (14.2)

General Distribution.--Breeds from central British Columbia, southern Mackenzie, central Saskatchewan, Ontario, southern Quebec, and New Brunswick south to southern Lower California, Tamaulipas, Arkansas, Tennessee, and New Jersey; breeds also sporadically in Florida, southern México, Guatemala, and Nicaragua. Winters from the southern half of its breeding range south to Panamá and the West Indies (at least to the northern Greater Antilles).

Distribution in Guatemala.--Observed chiefly on the large interior lakes and on lagoons and marshes of the Pacific coastal plain.

Records.--Lake Amatitlán, February 28, March 9, 25, and 29, 1946; Lake Atitlán, March 5, 1942; March 1 and May 1, 1946; April 22 and May 31, 1947; Lake Pino, March 12, 1942; Lake Atescatempa, March 15, 1942; April 25-27, 1946; April 19-20, 1947; Lake Retana, March 24, 1942; Lake Izabal, January 26, 1947; Lake Petén, January 30, 1947. This species was recorded at many lagoons along the Pacific Coast from Ocós eastward to Ahumado on January 29, February 3 and 11, and in April and May, 1947.

In literature it has been recorded from: Lake Petén, Lake Dueñas, Cobán (Salvin and Godman); Amatitlán, Atitlán (Dearborn); San Lucas (Griscom).

Habits and Hunting.--The coot is of common occurrence on lagoons and other waters. As it is of fair size and relatively easy to shoot, it should be utilized as a game bird to an even greater extent than it is. When properly prepared it is well flavored and palatable.

49. Jacana spinosa spinosa (Linnaeus)

Central American Jacana

Other Names.--

Guatemalan: ala amarilla, gallito, Jesusito

Status.--Local resident of freshwater marshes, streams, and ponds in the Tropical Zone.

Description.--Suggestive of a shorebird in appearance but entirely different in coloration, with long legs and extremely long toes; flight rail-like; often hold wings extended vertically above back when alighting.

Adult.--Body dark rust red, head and neck blackish; outstretched wing with flight feathers greenish yellow, rest of wing dark; a bright yellow frontal shield on the forehead.

Immature.--Body grayish brown above, white below except for buffy tinge to breast; a broad white stripe over eye.

Voice.--A sharp cackling note, singly or in series.

Measurements.--

Male (3)	Female (3)
Wing, 115-121 (118.3)	Wing, 128-131 (129.7)
Tail, 40.5-43 (42.2)	Tail, 43-45.5 (44.5)
Tarsus, 52.5-55 (53.5)	Tarsus, 56-59 (57.2)
Culmen from nostril, 17-18.5 (17.7)	Culmen from nostril, 18-19 (18.7)

General Distribution.--Central America from Guatemala and Belize (British Honduras) south to extreme western Panama.

Distribution in Guatemala.--Resident of the lagoons and marshes of the Pacific Coast and Petén.

Records.--Lagoons adjacent to the Chiquimulilla Canal near Jicaro and Papaturro, January 29, 1947; Lake Petén, January 30, 1947; near the mouth of the Río Motagua, January 30, 1947; and January 11, 1948; near Ocós, January 31, 1947.

In literature it is recorded from: Santana Mixtán, Huamachal, Lake of Petén; Lake of Amatitlán (Salvin and Godman); Hacienda California, Pajapita (Griscom).

Habits and Hunting.--This colorful, graceful, little species should not be considered a game bird.

50. Haematopus ostralegus palliatus Temminck

American Oyster-catcher

Other Names.--
None known.

Status.--The oyster-catcher apparently occurs only as a migrant or visitant along the Pacific Coast.

Description.--A conspicuously pied dark and white shorebird about the size of a crow, with a large red bill which is flattened laterally, like a knife blade; head, neck, and upper breast glossy black; upper tail coverts white, tail dark gray; underparts white; iris and eye-ring red, orange, or yellow.

Voice.--Variety of calls, one a shrill wheep, wheep, wheo.

Measurements.--

Male (5)	Female (5)
Wing, 253.4	Wing, 260.2
Tail, 98.2	Tail, 102.4
Tarsus, 55.6	Tarsus, 55.6
Culmen, 81.1	Culmen, 88.6

General Distribution.--Atlantic and Gulf coasts of North and South America from Virginia to Brazil; the West Indies (except Bahama Islands); Pacific coast of America from the Isthmus of Tehuantepec to the Bay of Panamá, and Colombia.

Distribution in Guatemala.--Migrant, observed only on the Pacific Coast.

Records.--This species was not observed during our survey.
In literature it has been recorded from: Pacific Coast, Nagualate, Chiapam (Salvin and Godman); Champerico in September (Griscom).

Habits and Hunting.--Not a game bird.

51. Squatarola squatarola (Linnaeus)

Black-bellied Plover

Other Names.--
Guatemalan: none known
English: gray plover

Status.--This species is a regular migrant and winter visitant along the Pacific Coast, and undoubtedly occurs at times on the Caribbean Coast, since it has been recorded at La Ceiba, Honduras.

Description.--A fairly large, stocky, short-legged, short-billed plover. In winter plumage, upperparts blackish-brown mottled with lighter coloring, underparts white, streaked with gray on neck, breast, and sides. In flight, the white rump and tail, white patch in the wing, and the black axillars are diagnostic. Legs and feet dark gray to black.

Voice.--A mellow, whistled whee-er.

Measurements.--

Male (12)	Female (12)
Wing, 178-199 (189.3)	Wing, 179-196 (187.5)
Tail, 68-82 (75.4)	Tail, 69-84 (73.7)
Tarsus, 42-51 (45.3)	Tarsus, 41.5-48.5 (44.7)
Culmen, 29.5-31.5 (30.4)	Culmen, 27.5-31 (29.5)

General Distribution.--Breeds on the Arctic tundra of Europe and Asia from the Kanin Peninsula to east Siberia; Kolguev, Great Lyakov, and Wrangel Islands; in North America from Alaska along the Arctic coast and islands east to Baffin and Southampton Islands. Migrates south through Europe, Asia, and North America to winter quarters in Africa, Madagascar, India, the East Indies, Australia, southern United States, West Indies, and South America to Chile and Peru; Galapagos Archipelago.

Distribution in Guatemala.--Migrant, observed only on the Pacific, but undoubtedly also occurs on the Caribbean coast as it has been recorded at La Ceiba, Honduras, by Deignan.

Records.--This species was observed at several places along the Pacific Coast, especially near Champerico, Tahuesco, and Sipacate, on January 31 and February 11, 1947; Iztapa, April 2, 1947.
In literature this species has been recorded from: Chiapam (Salvin and Godman); Champerico, September 10 (Griscom).

Habits and Hunting.--The black-bellied plover frequents the flats and coastal beaches. It is too scarce to be considered a game bird, and should be fully protected by law.

52. Pluvialis dominica dominica (P. L. S. Müller)

American Golden Plover

Other Names.--
None known.

Status.--This species apparently is an uncommon spring migrant. It should occur along the Pacific Coast at that season.

Description.--Similar to the black-bellied plover in winter plumage except that underparts are gray, and the tail and wings are plainly colored, lacking the white and black markings of the previous species. Legs and feet bluish gray to black.

Voice.--A harsh, whistled wheedle or whee.

Measurements.--

Male (11)	Female (6)
Wing, 159-183.5 (176.4)	Wing, 176-183 (180.8)
Tail, 60-75 (67.9)	Tail, 64-70 (66)
Tarsus, 38.5-45 (41.9)	Tarsus, 41-44.5 (43)
Culmen, 20.5-24 (22.2)	Culmen, 22-23.5 (22.5)

General Distribution.--Breeds in Arctic North America from Point Barrow to Melville Peninsula north to Melville and North Devon Islands, south to west side of Hudson Bay (Churchill). Migrates south chiefly over the Atlantic Ocean from Nova Scotia to the north coast of South America, thence to the plains of southern South America from Bolivia and southern Brazil south to the pampas of eastern Argentina. The northward migration in spring takes place up the Mississippi Valley.

Distribution in Guatemala.--Observed at Dueñas and along the Pacific Coast during spring migration.

Records.--Not observed during our survey.
In literature the only record is from Dueñas, the second week in April 1858 (Salvin and Godman).

Habits and Hunting.--Similar to the preceding species, but even fewer in numbers.

53. Charadrius hiaticula semipalmatus Bonaparte

Semipalmated Plover

Other Names.--
None known.

Status.--This species probably is a common migrant along the Pacific Coast.

Description.--Slightly smaller than the Wilson's plover and about half the size of a killdeer, with a much shorter bill, orange-yellow at base. Upper parts dark brown, underparts white with single collar across the breast. In winter plumage this collar is dark brown, in summer black. Legs and feet orange-yellow to flesh color, toes webbed at base.

Voice.--Call note is cher-wee.

Measurements.--

Male (11)	Female (7)
Wing, 119.4	Wing, 119.8
Tail, 54.8	Tail, 55.7
Tarsus, 22.3	Tarsus, 22.3
Culmen, 12.5	Culmen, 12.5

General Distribution.--Breeds on the Arctic coast of North America from Bering Sea to southern Baffin Island, south to the Yukon Valley, Queen Charlotte Islands, northern British Columbia, James Bay, north shore of the Gulf of St. Lawrence, New Brunswick, and Nova Scotia. Winters from central California, the Gulf coast, and South Carolina to Chile and Argentina; Galapagos Archipelago.

Distribution in Guatemala.--Recorded only on the Pacific Coast and in the Petén, but undoubtedly occurs on the Caribbean Coast also, since it has been collected at La Ceiba, Honduras, by Deignan.

Records.--Iztapa, April 2, 1947; Lake Atescatempa, April 19, 1947.
In literature it has been recorded only from Chiapam (Salvin and Godman), and Remate (Van Tyne), but is undoubtedly fairly common along the Pacific Coast, as it is common along the coast of El Salvador between September 4 and April 14 (Dickey and van Rossem).

Habits and Hunting.--This small plover should not be considered a game bird, and should be fully protected by law.

54. Charadrius collaris Vieillot

Ring Plover

Other Names.--
None known.

Description.--Small plover, smaller than a semipalmated plover or sanderling; forehead, cheeks, and underparts pure white except for a black band across upper chest, and another from bill to eye; bill black, twice as long as that of semipalmated plover; upperparts grayish brown margined with buff; legs and feet flesh color.

Measurements.--

Male (27)	Female (23)
Wing, 95.3	Wing, 94.4
Tail, 45.2	Tail, 42.8
Tarsus, 25.2	Tarsus, 24.9
Culmen, 14.4	Culmen, 14.6

General Distribution.--Greater part of tropical America from Vera Cruz and Oaxaca south to Peru, Bolivia, northern Argentian (Provinces of Mendoza, Cordoba, and Buenos Aires), and Uruguay; islands of Granada, Tobago, Trinidad, and Bonaire; accidental (?) in Chile.

Distribution in Guatemala.--Recorded as a migrant on both coasts.

Records.--San José, March 8, 1942; Panzós, May 18, 1947.
In literature it has been recorded from Chiapam (Salvin and Godman); Ocós, in early October, and near Puerto Barrios, August 21, 1930 (Griscom).

Habits and Hunting.--This small plover should be fully protected by law.

55. Charadrius vociferus vociferus Linnaeus

Killdeer

Other Names.--
Guatemalan: collarejo
English: killdee

Status.--The killdeer is a very common winter resident and migrant.

Description.--Medium-sized plover with top of head, upper back, and wing coverts dark brown, rump and upper tail coverts bright cinnamon brown; underparts white with two black bands across lower neck and upper breast.

Voice.--Very noisy, calling kill-dee, kill-dee when approached.

Measurements.--

Male (18)	Female (14)
Wing, 160.2	Wing, 160.1
Tail, 95.6	Tail, 94.9
Tarsus, 34.6	Tarsus, 35.2
Culmen, 20.3	Culmen, 20.4

General Distribution.--Breeds from northern British Columbia, southern Mackenzie, northern Ontario, and southern Quebec, south to southern Lower California, central Mexico, the Gulf coast, Florida, and the Bahama Islands. Winters from southern British Columbia, Colorado, southern Illinois, western New York, and New Jersey south to the West Indies and northern South America.

Distribution in Guatemala.--Migrant and winter resident, ranging from freshwaters on the Pacific coastal plain to highland lakes, streams, and meadows.

Records.--This species was observed at many localities on the coastal plains and in the interior: Desconsuelo, above Totonicapán, at 10,200 feet, May 3, 1947; Cerritos, March 27-28, 1946; Chiquimulilla, March 27, 1946; San José, March 8, 1942; February 28, 1946; April 2-3, 1947; Tiquisate, April 9, 1946; Panajachel, March 1 and May 1, 1946; Lake Atescatempa, April 25, 1946; Lake Amatitlán, February 28, 1946, near San Pedro Jocopilas, April 23, 1947; Sacapulas, April 23, 1947; Guatemala City, February 28 and March 27, 1946; Masagua, March 19, 1947.

In literature it has been recorded from: Dueñas, Quezaltenango, San Gerónimo, Panajachel, Atitlán (Salvin and Godman); Sacapulas, Guatemala City; Momostenango, Chichicastenango (Griscom); Desconsuelo (Wetmore).

Habits and Hunting.--Although the killdeer is more common than many of the other shorebirds, it is too scarce within the Republic to be considered a game bird.

56. Charadrius wilsonia beldingi (Ridgway)

Belding's Plover

Other Names.--
None known.

Status.--This plover probably is a fairly common visitant along the Pacific Coast during midwinter and spring months.

Description.--Small plover with a relatively long, stout black bill; slightly larger than the semipalmated plover; upperparts drab brown, lighter than in semipalmated plover; underparts white with breast collar black in male, gray or brown in female.

Voice.--Call note is a sharp, whistled wheep.

Measurements.--

Male (2)	Female (3)
Wing, 115.5	Wing, 115.5
Tail, 46.7	Tail, 47.2
Tarsus, 27.7	Tarsus, 28.0
Culmen, 20.0	Culmen, 20.7

General Distribution.--Resident on the Pacific Coast from Lower California to Peru.

Distribution in Guatemala.--Observed along the Pacific Coast.

Records.--Several were observed April 12, 1946, at the coastal lagoon, mouth of the Río Madre Vieja, south of Tiquisate.

In literature it has been recorded from Chiapam, near Champerico (Salvin and Godman).

Habits and Hunting.--This plover is too small to be considered a game bird.

57. Bartramia longicauda (Bechstein)

Upland Plover

Other Names.--
Guatemalan: ganga

Status.--This plover is a common migrant during autumn and spring months. They are heard frequently at night as they pass overhead enroute to or from their wintering grounds in South America.

Description.--Body slightly larger than that of a killdeer, but with a very slender neck, small head, and slender bill; upperparts dark, somewhat mottled; underparts buffy white; short legs, and long tail; erect posture.

Voice.--A most melodious, quavering whistle, usually three or more times, especially when it takes flight or is passing overhead during migration. Often heard at night.

Measurements.--

Male (10)	Female (9)
Wing, 157-181 (163.3)	Wing, 161-178 (166.6)
Tail, 79-92 (83.4)	Tail, 79-89.5 (75.6)
Tarsus, 43.5-49 (46.4)	Tarsus, 47-50.5 (48.5)
Exposed culmen, 26-31 (28.2)	Exposed culmen, 27.5-32 (29.8)

General Distribution.--Breeds from northwestern Alaska, southern Mackenzie, southern Manitoba, central Wisconsin, southern Ontario, southern Quebec and Maine, south to southern Oregon, northeastern Utah, Colorado, southern Oklahoma, southern Missouri, southern Indiana, and northern Virginia. Winters in southern South America east of the Andes from Brazil and northern Argentina south to the Río Negro.

Distribution in Guatemala.--Recorded as a migrant in the Petén, the central highlands, and on the Pacific Coast. Probably more common in the highlands.

Records.--Migrants were heard calling as they passed over Guatemala City during the nights of April 16 to 21, and May 6 to 10, 1946, and on April 19 and 20, and May 4 and 5, 10, and 11, 1947. They were observed at Lake Retana on March 24, 1942, and near San José, April 1, 1947.

In literature this species has been recorded from: Dueñas and Sakluk (Salvin and Godman). Sakluk is the former name for La Libertad.

Habits and Hunting.--This species is too scarce to be considered a game bird.

58. Numenius borealis (Forster)

Eskimo Curlew

Other Names.--
None known.

Status.--This Eskimo curlew is generally considered to be nearly or quite extinct. There have been no records in Guatemala since 1861.

Description.--Smallest of the curlews; bill relatively short and only slightly curved; crown dark without well defined median stripe; upperparts warm brown mottled with buff; underparts buffy brown, lightly streaked; primaries solid blackish, not barred.

Voice.--Has been described as a melodious whistled bee, bee; also as a sharp squeak suggestive of the single note of a common tern.

Measurements.--

Male (5)	Female (5)
Wing, 200.5-214 (206.3)	Wing, 189.5-215 (203.8)
Tail, 77-80.5 (80.1)	Tail, 76-82 (79-8)
Tarsus, 39.5-44 (42.1)	Tarsus, 41-45 (43.9)
Exposed culmen, 48-53 (51.3)	Exposed culmen, 47-60 (54.9)

General Distribution.--Bred formerly on the Barren Grounds of northern Mackenzie and the Norton Sound region of Alaska. Wintered in Chile and on the plains of Argentina. The southward migration route was from the coast of Labrador, New England, and Long Island over the Atlantic Ocean, returning northward across the Gulf of Mexico and up the Mississippi Valley. Now virtually extinct.

Distribution in Guatemala.--Recorded only from San Gerónimo, near Salamá.

Records.--This species was not observed during the present survey.
In literature it has been recorded only from San Gerónimo, which is near Salamá, in April (Salvin, Ibis, 1861, p. 356).

Habits and Hunting.--This curlew is too rare in occurrence to be considered a game bird.

59. Numenius phaeopus hudsonicus Latham

Hudsonian Curlew

Other Names.--
None known.

Status.--The Hudsonian curlew is a fairly common migrant and winter visitant along the Pacific Coast.

Description.--Similar to but smaller than the preceding species. Wings without cinnamon lining; crown dark with a contrasting light median line; a dark line through eye; bill usually much shorter.

Voice.--Two principal calls, one a low, two-noted whistle, the other a series of four or more sharp, staccato whistles.

Measurements.--

Male (13)	Female (11)
Wing, 231-257 (239.1)	Wing, 240-267 (252.4)
Tail, 88-101 (92.9)	Tail, 92-102 (97.1)
Tarsus, 52-61 (55.7)	Tarsus, 54-61 (57.9)
Exposed culmen, 77-93.5 (83.1)	Exposed culmen, 84-95.5 (91.5)

General Distribution.--Breeds on the Arctic coast of North America from Norton Sound to the Anderson River, and locally to Fort Churchill. Winters from southern California south on the Pacific Coast of America to Chiloe Island, Chile, and on the east coast from British Guiana to the mouth of the Amazon; Galapagos Archipelago. In migration on both coasts of North America and islands in the West Indies.

Distribution in Guatemala.--Pacific Coast during fall, winter, and spring months.

Records.--Near Sipacate, and Playa Grande at the mouth of the Río Samalá, January 31, 1946; near Champerico on February 11, 1946, and January 14, 1948; near Ahumado, January 29, 1947; San José, April 1 and Iztapa, April 2, 1947.
In literature it has been recorded from: Chiapam (Salvin and Godman); Ocós and Champerico (Griscom).

Habits and Hunting.--This large shorebird is to be looked for on the mud flats and broad beaches. It is too few in numbers for hunting and should be completely protected by law.

60. Numenius americanus americanus Bechstein

Long-billed Curlew

Other Names.--
Guatemalan: zarapico pico largo, chorlo

Status.--The long-billed curlew apparently is an uncommon or rare winter visitant on the Pacific Coast and at inland lakes.

Description.--A very large shorebird with very long, decurved bill; upperparts dark brown, underparts light cinnamon buff with narrow, dark streaks on neck and breast. Wing linings bright cinnamon, crown dark brown without black bands.

Voice.--Loud, mellow curlew, curlew, sometimes a trilling call.

Measurements.--

Male (7)		Female (5)	
Wing,	268.2 - 288 (279.3)	Wing,	268 - 308 (291.3)
Tail,	105.5 - 128.3 (114.2)	Tail,	104 - 135.6 (118.4)
Tarsus,	77 - 90.4 (83.2)	Tarsus,	81 - 93.7 (86.9)
Exposed culmen,	137 - 155.2 (145.3)	Exposed culmen,	163 - 219.2 (184)

General Distribution.--Breeds from northern Nevada, southern Idaho, and southern South Dakota, south to central Utah, central New Mexico, and southeastern Texas. Winters from central California, southern Arizona, and southern Texas and southern Louisiana, south to Baja California and Guatemala.

Distribution in Guatemala.--On the Pacific Coast; recorded also at Dueñas.

Records.--This species was not observed during the present survey.
In literature it has been recorded from: Dueñas and Chiapam (Salvin and Godman).

Habits and Hunting.--Similar to the preceding species. Hunting it should be prohibited.

61. Limosa fedoa (Linnaeus)

Marbled Godwit

Other Names.--
None known.

Status.--This godwit is believed to be an uncommon winter visitant or migrant along the Pacific Coast.

Description.--A very large shorebird, slightly larger than the Hudsonian curlew; its long bill usually noticeably upturned; general coloration reddish buffy brown, paler below; legs and feet bluish gray; larger than the Hudsonian godwit and without white patch at base of tail.

Voice.--Sharp ter whit, ter whit.

Measurements.--

Male (5)		Female (8)	
Wing,	221 - 228 (225.4)	Wing,	212 - 234 (224.1)
Tail,	77.5 - 95 (82.9)	Tail,	79 - 89 (83.4)
Tarsus,	67 - 75 (69.4)	Tarsus,	67 - 76.5 (71.4)
Exposed culmen,	92 - 119 (100.3)	Exposed culmen,	88.5 - 117.5 (104.8)

General Distribution.--Breeds from southern Alberta and southern Manitoba south to South Dakota (formerly to Utah, Nebraska, Iowa, and Wisconsin). Winters from central Lower California, Louisiana, and Georgia south to Peru.

Distribution in Guatemala.--Along the Pacific Coast; probably also occurs on the Caribbean Coast since it has been recorded at La Ceiba, Honduras, in March, by Deignan.

Records.--This species was not observed during our survey.
In literature it has been recorded at Chiapam (Salvin and Godman); and Champerico, September 10 (Griscom).

Habits and Hunting.--This large shorebird frequents the mud flats, beaches, and coastal meadows. It is too scarce to be considered a game bird.

62. Totanus flavipes (Gmelin)

Lesser Yellow-legs

Other Names.--
Guatemalan: caballero gambeta

Status.--This sandpiper is a fairly common migrant, especially on the Pacific Coastal Plain.

Description.--Smaller than the greater yellowlegs; its bill much smaller but straighter by comparison (that of the following species is slightly upturned): coloration practically identical.

Voice.--Less conspicuous than that of the greater yellowlegs; its whistled call a one or two-noted coo, or coo, coo.

Measurements.--

Adult male (15)		Adult female (10)	
Wing,	153.5	Wing,	155.8
Tail,	62.8	Tail,	63.2
Tarsus,	50.0	Tarsus,	50.3
Culmen,	36.4	Culmen,	35.5

General Distribution.--Breeds from Kotzebue Sound, northern Mackenzie, northern Manitoba and Ungava, south to northern British Columbia, central Alberta, and southern Manitoba; formerly to Illinois and New York. Winters in Chile and Argentina south to the Straits of Magellan, casually farther north; migrates chiefly east of the Rocky Mountains over the West Indies, México, and Central America.

Distribution in Guatemala.--On the Pacific Coast, also recorded at Dueñas and in the Petén.

Records.--Lake Retana, March 24, 1942; Lake Atescatempa, April 19, 1947; San José, March 8, 1942, and February 28, 1946; Iztapa, April 2, 1947; near Tiquisate, April 11, 1946; San Pedro Jocopilas, April 23, 1947.

In literature it has been recorded from: Dueñas (Salvin and Godman); La Libertad, September 20, 1923 (Van Tyne).

Habits and Hunting.--This small, slender sandpiper should not be considered a game bird.

63. Totanus melanoleuca (Gmelin)

Greater Yellow-legs

Other Names.--

None known.

Status.--The greater yellow-legs is believed to be a regular but relatively uncommon migrant.

Description.--Slightly smaller and much more slender than a willet, and with bright yellow legs and feet; upperparts grayish brown; underparts white, narrowly streaked with blackish on foreneck and upper breast. In flight its dark wings and whitish rump and tail are good field marks.

Voice.--A loud, clear, whistled whew, whew, whew, is characteristic.

Measurements.--

Adult male (20)		Adult female (11)	
Wing,	187.8	Wing,	188.9
Tail,	76.9	Tail,	76.6
Tarsus,	60.7	Tarsus,	59.4
Culmen,	55.8	Culmen,	55.5

General Distribution.--Breeds from Cook Inlet, Alaska, east through southern Mackenzie, central Alberta, Labrador, and Newfoundland, south to southern British Columbia, southern Manitoba, Mingan Islands, and Anticosti Island. Winters from central California, the Gulf States, and South Carolina over the West Indies, México, Central, and South America to the Straits of Magellan.

Distribution in Guatemala.--On the Pacific Coast, also recorded at Lake Atitlán and Dueñas.

Records.--Cerritos, March 27, 1946; near Tiquisate, April 11, 1946; Lake Atescatempa, April 20, 1946, and April 19-20, 1947.

In literature it has been recorded from: Dueñas, Chiapam, Atitlán (Salvin and Godman); Champerico and Ocós (Griscom).

Habits and Hunting.--This sandpiper frequents mud flats and the margins of lagoons and other waters. It is too few in numbers to be shot as a game bird.

64. Tringa solitaria solitaria Wilson

Solitary Sandpiper

Other Names.--
None known.

Status.--The solitary sandpiper is believed to be a regular but relatively scarce migrant and winter visitant. The western subspecies cinnamomea Brewster undoubtedly occurs also, as it migrates southward as far as Argentina, and has been recorded in El Salvador.

Description.--In winter plumage similar to the following species except grayer above, slightly grayer below; wing entirely dark; tail barred black and white. Nods more than teeters; has deeper wingstroke, flight strong and graceful; distinctive white ring around eye.

Voice.--A whistled, peet-weet similar to that of the following species.

Measurements.--

Adult male (11)		Adult female (9)	
Wing,	126.5	Wing,	127.8
Tail,	53.7	Tail,	55.4
Tarsus,	29.9	Tarsus,	29.4
Culmen,	28.8	Culmen,	29.3

General Distribution.--Known to breed in central Alberta and probably does so locally east to Newfoundland. Winters from southern Texas and the West Indies to Ecuador, possibly farther.

Distribution in Guatemala.--At interior waters from the Pacific coastal plain to the interior highlands, the Petén, and the lower Río Motagua.

Records.--Masagua, March 19-20, 1947; San José, February 28, 1946 and April 3 and 4, 1947; Tiquisate, near the mouth of the Río Madre Vieja, April 11, 1946; near Panajachel, March 5, 1942.

In literature this species has been recorded from: San Gerónimo, Dueñas (Salvin and Godman); Finca Sepacuité, Chimoxán in September and early October, Finca Chamá in early May, Panajachel, August 11 (Griscom); Uaxactún and La Libertad (Van Tyne).

Habits and Hunting.--This little sandpiper is too small and scarce to be considered a game bird.

65. Actitis macularia (Linnaeus)

Spotted Sandpiper

Other Names.--
None known.

Status.--The spotted sandpiper is a common migrant and visitant, chiefly in the autumn, winter, and spring months.

Description.--Small sandpiper; in winter plumage, upperparts dark brown; underparts white with light grayish across upper breast; wing with white stripe; tail dark, bordered with white. Habit of teetering constantly and the short, stiff wingstroke are diagnostic characteristics.

Voice.--A whistled, peet-weet.

Measurements.--

Adult male (18)		Adult female (17)	
Wing,	100.5	Wing,	104.0
Tail,	49.0	Tail,	50.4
Tarsus,	22.2	Tarsus,	22.8
Culmen,	23.6	Culmen,	23.6

General Distribution.--Breeds throughout North America from the limit of trees in northwestern Alaska, northern Mackenzie, northern Manitoba, the Ungava Peninsula, and Newfoundland, south to southern California, southern New Mexico, southern Texas, southern Louisiana, central Alabama, and northern South Carolina. Winters from southern British Columbia, Louisiana, and South Carolina, throughout México and the West Indies to central Peru, Bolivia, and southern Brazil.

Distribution in Guatemala.--"A common species on nearly all the streams and lakes of Guatemala from early September to May," according to Anthony (Griscom).

Records.--San José, March 8, 1942; February 28, 1946; April 1, 1947; Istapa, April 2, 1947; Masagua, March 19-20, 1947; Finca Valle Lirios, March 23, 1947; Tiquisate, April 9, 1946; mouth of the Río Madre Vieja, April 12, 1946; Cerritos, March 26-29, 1946; Lake Amatitlán, February 28 and March 9, 1946; March 14-16, 1947; Lake Atitlán, March 5, 1942; March 1 and May 1, 1946; Río de las Vacas, near Morán, Dept. Guatemala, March 16, 1947; Lake Atescatempa, March 15, 1942; April 27, 1946; April 19, 1947; Trujillo, May 6, 1947; Zacapa to El Rancho, March 26, 1942.

In literature this species has been recorded from: Yzabal, Dueñas, Panajachel, San Gerónimo (Salvin and Godman); Atitlán, Amatitlán, El Rancho (Dearborn); Panajachel, La Primavera, Río Motagua (Griscom); Puerto Cortez (Wetmore).

Habits and Hunting.--This little sandpiper is too small and scarce to be considered a game bird.

66. Catoptrophorus semipalmatus inornatus (Brewster)

Western Willet

Other Names.--
None known.

Status.--The western willet is a common migrant and winter visitant along the Pacific Coast. As the eastern willet has been collected in El Salvador, this subspecies undoubtedly occurs along the southern coast of Guatemala, though it is probably much less common than the western race.

Description.--A large, gray shorebird, much larger than a yellow-legs or killdeer with a fairly long, straight beak. In winter plumage, upperparts brownish gray, underparts whitish shaded with gray; wings conspicuously banded black and white; legs bluish.

Voice.--Call a loud, clear pill willet.

Measurements.--

Adult male (11)		Adult female (6)	
Wing,	205.2	Wing,	213.5
Tail,	79.4	Tail,	80.9
Tarsus,	64.9	Tarsus,	68.3
Culmen,	59.4	Culmen,	64.1

General Distribution.--Breeds from central Oregon, southern Alberta, Saskatchewan, and southern Manitoba south to northeastern California, central Colorado, Nebraska, and northern Iowa. Winters on the Pacific Coast of America from California to Peru, the Galapagos Archipelago, and on the Gulf coast of the United States; in autumn migration occurs on the Atlantic coast of the United States.

Distribution in Guatemala.--On the Pacific Coast; undoubtedly occurs on the Caribbean also as it has been collected at La Ceiba, Honduras, by Deignan.

Records.--For the Species: Ahumado, January 29, 1947; Papaturro, January 29, 1947; San José, March 8, 1942, and February 11, 1947; Iztapa, April 2, 1947; Sipacate, January 31, 1947; Río Madre Vieja, January 31, 1947; Playa Grande on the Río Samalá, January 31 and February 11, 1947; Champerico, January 31 and February 11, 1947; Río Tilapa, January 31, 1947; Tahuesco, February 11, 1947.

In literature it has been recorded from: Chiapam and San José (Salvin and Godman); Ocós and Champerico (Griscom).

This form is apparently the more common one, but Dickey and van Rossem recorded two specimens of the Eastern Willet, C. s. semipalmatus (Gmelin), at Puerto del Triunfo, El Salvador, so the eastern race probably also occurs in Guatemala. They also collected specimens of inornatus at Puerto del Triunfo and at Barra Santiago.

Habits and Hunting.--It is recommended that this species be protected throughout the year.

67. Aphriza virgata (Gmelin)

Surf-bird

Other Names.--
None known.

Status.--The surf-bird is reported to be a rare transient along the Pacific Coast, but no specimens have been obtained.

Description.--A stout sandpiper-like shorebird about the size of a killdeer, dark gray in general appearance, with a white wing stripe, and a white tail broadly tipped with black, legs and feet yellow.

Voice.--Call a sharp pee-weet.

Measurements.--

Adult male (17)	Adult female (7)
Wing, 170.9	Wing, 176.0
Tail, 65.2	Tail, 65.0
Tarsus, 29.6	Tarsus, 30.5
Culmen, 24.2	Culmen, 24.9

General Description.--Breeds on the Alaskan Mountains in south-central Alaska. Winters southward along the Pacific Coast of the Americas to the Straits of Magellan.

Distribution in Guatemala.--On the Pacific Coast.

Records.--This species was not observed during the present survey.

In literature it has been recorded by Anthony at Champerico on September 10, and again the following week (Griscom), the year of the records not being mentioned.

Habits and Hunting.--It is recommended that this bird be fully protected by law. It is too rare in the Republic to be considered a game bird.

68. Arenaria interpres morinella (Linnaeus)

Ruddy Turnstone

Other Names.--
None known.

Status.--The ruddy turnstone is believed to be a fairly common migrant and winter visitant to both coasts.

Description.--Medium-sized but chunky shorebird, smaller than killdeer, with conspicuously variegated color pattern and short red legs. In winter plumage, head, upperparts, and breast mostly brown; belly and rump white; tail white with subterminal dark band; wings conspicuously banded dark and white.

Voice.--A melodious, whistled quittock.

Measurements.--

Adult male (17)	Adult female (10)
Wing, 149.9	Wing, 153.1
Tail, 61.2	Tail, 62.4
Tarsus, 24.3	Tarsus, 24.8
Culmen, 20.8	Culmen, 21.9

General Distribution.--Breeds on the arctic coasts and islands of North America from the Mackenzie to western Baffin Island south to Southampton Island. Winters in the southeastern Atlantic and Gulf States of the United States, the West Indies, and east coast of South America to southern Brazil.

Distribution in Guatemala.--Occurs on both coasts.

Records.--April 12, 1946, at the mouth of the Río Madre Vieja, south of Tiquisate.
In literature it has been recorded from: both coasts, Chiapam (Salvin and Godman); Champerico (Griscom).

Habits and Hunting.--This turnstone frequents the ocean beaches, and occasionally the shores of coastal lagoons.
It is not sufficiently numerous to be considered a game bird.

69. Limnodromus griseus griseus Gmelin

Eastern Dowitcher

Other Names.--

None known.

Status.--The eastern dowitcher is probably the subspecies which occurs as a common migrant and winter visitant. No specimens have been obtained in Guatemala, but those taken in El Salvador have been of this subspecies.

Description.--A stout, very long-billed sandpiper, larger in size than a snipe. In winter plumage, upperparts gray, more or less streaked; a very noticeable white area on the lower back and rump which is especially conspicuous in flight, as is the white tail; neck, breast, and sides light gray, belly white; legs and feet light yellow or greenish. The white markings and long bill identify this species.

Voice.--A quavering whistle, wheu-whup.

Measurements.--

Adult male (11)	Adult female (10)
Wing, 141.0	Wing, 142.9
Tail, 54.6	Tail, 54.5
Tarsus, 33.5	Tarsus, 33.3
Culmen, 55.3	Culmen, 59.4

General Distribution.--The known breeding grounds are in Alberta from Lake Athabasca south to about lat. 53° N. and near Churchill on the west side of Hudson Bay; known in summer from the intervening region. Winters southern California, the Gulf States, and Florida south to Peru and eastern Brazil. In migration chiefly on the Atlantic coast of the United States.

Distribution in Guatemala.--A common winter visitant and migrant on the Pacific Coast; and occasionally at localities in the interior.

Records.--Ahumado, January 29, 1947; Tahuesco, Playa Grande, and Champerico, February 11, 1947.

In literature it has been recorded from Chiapam, Lake of Dueñas, San Gerónimo (Salvin and Godman).

Griscom, who listed the probable form observed in Guatemala as scolopaceus, wrote, "In default of specimens, the subspecies is based on geographic probabilities." Dickey and van Rossem reported that several specimens collected on the coast of El Salvador during December and January were all referable to the eastern race, L. g. griseus Gmelin, so this is probably the one which is most likely to occur in Guatemala, but undoubtedly both are present during migration.

Habits and hunting.--This dowitcher frequents the muddy shores and flats adjacent to the coastal lagoons.

Like the other shorebirds, it should be fully protected by law.

70. Capella delicata (Ord)

Wilson's Snipe

Other Names.--

Guatemalan: agachona, becacina
English : snipe

Status.--The Wilson's snipe is a fairly common migrant and winter visitant.

Description.--Slightly larger but stouter than a killdeer, with short legs and a very long bill. Upperparts blackish-brown conspicuously streaked with buff; breast light streaked and spotted with blackish; throat and belly white.

Voice.--A sharp, rasping scape.

Measurements.--

Male (18)	Female (20)
Wing, 121 - 130 (127.1)	Wing, 117.5 - 135 (125.2)
Tail, 52 - 63 (57.1)	Tail, 50 - 58.5 (54.5)
Tarsus, 27.5 - 32 (30.4)	Tarsus, 28 - 33.5 (30.8)
Exposed culmen	Exposed culmen, 58.5 - 73.5 (65.4)

General Distribution.--Breeds from western Alaska, northern Yukon, northern Mackenzie, northern Manitoba, Ungava, and Newfoundland, south to southern California, northern Nevada, southern Colorado, northern Iowa, northern Indiana, central Ontario, and northwestern Pennsylvania. Winters from the southern part of its breeding range south through Central America and the West Indies to Colombia and Brazil.

Distribution in Guatemala.--Visitant to the interior highlands and the Pacific Coast.

Records.--San José, March 8, 1942; February 28, 1946; Chimaltenango, March 2, 1946; Lake Atescatempa, March 15, 1942; April 27, 1946.

In literature this species has been recorded from: Guatemala City, Dueñas, Cobán, Choctum, Tactic, San Gerónimo, Atitlán (Salvin and Godman).

Habits and Hunting.--This snipe seems to be found most often in wet, brush-fringed meadows and open marshes.

It is apparently too scarce to be of value as a game bird.

71. Crocethia alba (Pallas)

Sanderling

Other Names.--

Guatemalan: caballero gambeta

Status.--The sanderling is believed to be a common migrant and winter visitant along the coasts. It has been recorded as common during these seasons on the coast of El Salvador.

Description.--Slightly larger than a spotted sandpiper, with a conspicuous white wing stripe. In winter plumage, light gray above, white below; head nearly white. At this season it is the palest of the sandpipers, and is usually seen on the outer beaches; very active.

Voice.--Call is a short kip or ket, singly or in series.

Measurements.--

Adult male (14)	Adult female (13)
Wing, 119.1	Wing, 123.0
Tail, 50.3	Tail, 52.8
Tarsus, 23.7	Tarsus, 24.7
Culmen, 24.7	Culmen, 26.0

General Distribution.--Breeds in the high north on arctic islands north of North America, Southampton Island, and northern Greenland. Winters from central California, the Gulf coast and Virginia, south to southern Chile and southern Argentina.

Distribution in Guatemala.--Common visitant along the Pacific Coast. As it has been recorded at La Ceiba, Honduras, the species probably occurs on the Caribbean Coast of Guatemala.

Records.--San José, March 8, 1942; mouth of the Río Madre Vieja, April 12, 1946.
In literature it has been recorded from: Carranza, Chiapam, Río Nagualate (Salvin and Godman); Ocós in September and October (Griscom).

Habits and Hunting.--The sanderling is most often observed along the ocean beaches.
Like the other shorebirds, and especially the small ones, it should be fully protected by law.

72. Ereunetes mauri Cabanis

Western Sandpiper

Other Names.--
None known.

Status.--The western sandpiper is probably a very common migrant and winter visitant along the Pacific Coast. Studies in El Salvador have indicated that this sandpiper is one of the most common there at these seasons.

Description.--Similar to the least sandpiper but has a longer bill, thicker at the base; its legs and feet are black instead of greenish.

Voice.--Whistled cheep or chee-up.

Measurements.--

Adult male (12)	Adult female (11)
Wing, 94.6	Wing, 96.4
Tail, 40.2	Tail, 41.7
Tarsus, 21.2	Tarsus, 22.1
Culmen, 22.5	Culmen, 25.9

General Distribution.--Breeds on the coast of Alaska from the delta of the Yukon to Point Barrow. Winters on both coasts of America from Washington and North Carolina to Peru and Venezuela, including, Cuba, Hispaniola, and Trinidad.

Distribution in Guatemala.--Along the Pacific Coast. It has been recorded in midwinter at Puerto del Triunfo, El Salvador.

Records.--This species was not observed during the survey.
In literature it has been recorded from: Dueñas, Chiapam, Carranza, and San José (Salvin and Godman).

Habits and Hunting.—The western sandpiper frequents the mud flats and lagoon shores. Like the other sandpipers, it should be fully protected by law.

73. Erolia minutilla (Vieillot)

Least Sandpiper

Other Names.—
None known.

Status.—The least sandpiper is believed to be a common migrant and winter visitant, as it is known to be common in the lowlands of El Salvador during autumn, winter, and spring.

Description.—A very small sandpiper with a short, slender bill and greenish or yellowish legs. In winter plumage it is grayish brown above, white below, with more or less streaking on the upper breast.

Voice.—A plaintive, whistled pe-et, pe-et.

Measurements.—

Adult male (22)	Adult female (16)
Wing, 85.5	Wing, 86.5
Tail, 38.2	Tail, 37.1
Tarsus, 17.7	Tarsus, 18.1
Culmen, 17.2	Culmen, 18.7

General Distribution.— Breeds in northern North America south of the Barren Grounds from northwestern Alaska to Labrador south to the upper Yukon Valley, northern British Columbia, Fort Churchill (probably), Magdalen Islands, Newfoundland, and Sable Island. Winters from southern California, Texas, and North Carolina south through México, Central America, the West Indies and South America to Peru and eastern Brazil; Galapagos Archipelago.

Distribution in Guatemala.—Visitant on the Pacific Coast; one record from Los Amates on the lower Río Motagua.

Records.—Lake Atescatempa, March 15, 1942, April 27, 1946, and April 19, 1947.
In literature it has been recorded from: Dueñas, Chiapam, Río Nagualate (Salvin and Godman); Los Amates (Dearborn).

Habits and Hunting.—See the preceding species.

74. Erolia melanotos (Vieillot)

Pectoral Sandpiper

Other Names.—
None known.

Status.—The pectoral sandpiper is probably a common migrant, at least during autumn. It is so recorded for El Salvador, being abundant in the fall but rare in the spring.

Description.—A streaked, brown sandpiper smaller than a killdeer and larger than a spotted sandpiper, with a dark, unbanded wing. Its white breast is conspicuously streaked with brown in sharp contrast to the unmarked white belly.

Voice.—Usually two rather harsh notes, creek, creek.

Measurements.—

Male (8)	Female (15)
Wing, 139.8	Wing, 125.8
Tail, 62.4	Tail, 55.3
Tarsus, 27.7	Tarsus, 25.8
Culmen, 28.4	Culmen, 25.8

General Distribution.--Breeds on the Arctic coast of northeastern Asia from the Kolyma Delta eastward, on the Arctic coast of North America from the mouth of the Yukon to Southampton Island, and on the west shore of Hudson Bay to the Nelson River. Migrates chiefly in the Mississippi Valley and along the Atlantic coast; winters in South America from Peru, Bolivia, and Argentina to south-central Chile and Chubut.

Distribution in Guatemala.--On the Pacific Coast, recorded also at Dueñas.

Records.--Lake Atescatempa, March 15, 1942, and April 19, 1947; Lake Retana, March 24, 1942.

In literature this species has been recorded from: Dueñas (Salvin and Godman); Champerico, September 10, and Ocós, in September and October (Griscom).

Habits and Hunting.--This species frequents the grassy flats and meadows adjacent to lakes and lagoons, as well as some of the shores.

Like the other sandpipers, it should be fully protected by law.

75. Micropalama himantopus (Bonaparte)

Stilt Sandpiper

Other Names.--
None known.

Status.--The stilt sandpiper is believed to be a regular, though rarely observed, migrant.

Description.--Similar to a lesser yellow-legs but slightly smaller, with greenish, not yellow, legs and a conspicuous white stripe above the eye; its bill is relatively long and heavy, and has a slight droop at its tip; in winter plumage is gray above, white below, somewhat streaked on neck and breast.

Voice.--Usually a single whistled wheu.

Measurements.--

Male (8)	Female (4)
Wing, 124.4	Wing, 127.0
Tail, 51.1	Tail, 51.5
Tarsus, 39.9	Tarsus, 42.9
Culmen, 38.5	Culmen, 39.9

General Distribution.--Breeds in arctic North America from Coronation Gulf to the west shore of Hudson Bay (Churchill). Winters in South America to Bolivia, Paraguay, northern Argentina (Buenos Aires Province), and Uruguay. On migration occurs in the West Indies, Florida, western Mississippi Valley, and to a lesser extent on the Atlantic coast of the United States, Central America, and México.

Distribution in Guatemala.--Recorded only at Dueñas, but probably a migrant along the Pacific Coast.

Records.--Lake Retana, March 24, 1942; Lake Atescatempa, April 19, 1947.

In literature it has been recorded only from Dueñas where Salvin shot one out of a flock of pectoral sandpipers.

Habits and Hunting.--The stilt sandpiper frequents mud flats, lake and lagoon shores.

Like the other sandpipers, it should be fully protected by law.

76. Himantopus himantopus mexicanus (P. L. S. Müller)

Black-necked Stilt

Other Names.--
Guatemalan: zancudo, zancudo negro

Status.--The black-necked stilt is a very common migrant and winter visitant along the Pacific Coast.

Description.--A large, very slender wader, black above and white below, with very long red legs. It is the only pure black and white shorebird. In flight its long red legs and feet extend far beyond the tail.

Voice.--A loud, sharp ip, ip, ip. A very noisy bird.

Measurements.--

Male (19)		Female (15)	
Wing,	222.4	Wing,	211.8
Tail,	72.9	Tail,	69.3
Tarsus,	108.8	Tarsus,	103.6
Culmen,	65.3	Culmen,	63.9

General Distribution.--Breeds locally from central Oregon, northern Utah, southern Nebraska, the coast of Louisiana, central Florida, and the Bahama Islands south to Lower California, México, Central and South America to Peru and northern Brazil; the Galapagos Archipelago and the West Indies. Migratory in the northwestern part of its range.

Distribution in Guatemala.--On the Pacific Coast.

Records.--San José, March 8, 1942; Sipacate, Tahuesco, Champerico, and near Ocós, January 31 and February 11, 1947; marshes adjacent to the Chiquimulilla Canal near Papaturro, January 29, 1947.

In literature it has been recorded from: Chiapam, San José (Salvin and Godman); Champerico and Ocós in September and October (Griscom).

Habits and Hunting.--This stilt is most often observed along the shores and flats of coastal lagoons and river deltas.

Like the other shorebirds it should be fully protected by law.

77. Recurvirostra americana Gmelin

Avocet

Other Names.--

None known.

Status.--The avocet is a regular but apparently scarce winter visitant to the Pacific Coast.

Description.--A very large shorebird with a long, slender, upturned bill. In winter plumage it is mostly black and white; the back and wings are largely blackish, the head and neck pale gray above, white below; underparts white.

Voice.--A loud plee-eek, plee-eek.

Measurements.--

Male (10)		Female (11)	
Wing,	222.4	Wing,	217.7
Tail,	83.8	Tail,	83.1
Tarsus,	91.3	Tarsus,	90.3
Culmen,	89.6	Culmen,	88.8

General Distribution.--Breeds from eastern Washington, southern Alberta (formerly farther north), and southern Manitoba, south to southern California, southern New Mexico, southern Texas, and northern Iowa (formerly farther east). Winters from Central California and southern Texas to Guatemala.

Distribution in Guatemala.--On the Pacific Coast.

Records.--Near Sipacate and Playa Grande at the mouth of the Río Samalá, January 29, 1947; near Champerico and Playa Grande, February 11, 1947.
In literature it has been recorded at Chiapam (Salvin and Godman); near Champerico, September 10, and at Ocós in late September and October (Griscom).

Habits and Hunting.--The avocet usually frequents coastal mud flats and very shallow lagoons.
This handsome shorebird, like other members of its family, should be fully protected.

78. Burhinus bistriatus bistriatus (Wagler)

Central American Thick-knee

Other Names.--
Guatemalan: alcaraván
English : big plover, desert plover

Status.--The thick-knee is a relatively scarce and very local resident.

Description.--A very large, brown plover-like bird about the size of a long-billed curlew, but with a large head, large eyes, and short, stout bill; underparts buffy or grayish white; legs long, greenish-yellow; iris yellow.

Voice.--A rattling, staccato series of notes, often given at night, as well as during the day.

Measurements.--

Male (6)	Female (4)
Wing, 261 - 273 (267.5)	Wing, 255 - 269 (262)
Tail, 132 - 139 (134.1)	Tail, 124 - 132 (128.4)
Tarsus, 113 - 121 (116.5)	Tarsus, 110 - 122 (116.4)
Exposed culmen, 49 - 53 (51.1)	Exposed culmen, 44 - 53.5 (49.5)

General Distribution.--Southern México from the states of Oaxaca and Vera Cruz south through Central America to western Costa Rica.

Distribution in Guatemala.--Local resident, recorded near Ocós, Salamá, and in the Department of Jutiapa.

Records.--Near Monjas, March 24, 1942; near Jalapa, March 24 and 25, 1942.
In literature it has been recorded from: Huamachal, San Gerónimo (Salvin and Godman); Ocós (Griscom).

Habits and Hunting.--The alcaravánes are too few in numbers and too restricted in range to be considered game birds. The species should be fully protected.

79. Columba flavirostris flavirostris Wagler

Red-billed Pigeon

Other Names.--
Guatemalan: cachajina, torcaza, paloma colorada, paloma morada
English : blue pigeon, coast pigeon, pigeon

Status.--The red-billed pigeon is a very common resident on the Pacific slope.

Description.--A large pigeon more or less purplish red on head, neck, and breast, especially in the male.
Adult male.--Head, neck, and breast rich, dark purplish red; middle of back brownish with bronze green gloss; wing with greater coverts and lining bluish gray; flight feathers dark gray; rump slate gray, tail somewhat darker and unbanded; belly, abdomen, and sides slate gray, sometimes bluish; bill pink for basal half, outer half pale horn, iris orange, eye ring red, legs and feet purplish red.

Adult female.--Similar to male but grayer.

Measurements.--

Male (15)		Female (10)	
Wing,	180 - 198.5 (192.4)	Wing,	184.5 - 207 (193.6)
Tail,	105 - 127 (118.7)	Tail,	112 - 126 (119.2)
Tarsus,	23 - 28 (25.8)	Tarsus,	24 - 26.5 (25.2)
Culmen,	13 - 16 (14.3)	Culmen,	14 - 15.5 (14.8)

General Distribution.--Southeastern Sonora, Sierra Madre of Chihuahua, San Luis Potosí, and the lower Río Grande Valley in Texas, south over México and Central America to Nicaragua and eastern Costa Rica.

Distribution in Guatemala.--Tropical Zone, Pacific slope. Most abundant in woodlands of the coastal plain.

Records.--Cerritos, breeding, March 27-29, 1946; Chiquimulilla, breeding, March 26, 1946; Escuintla to San José, February 28, 1946; Naranjo, March 8, 1942; Patulul, April 8, 1946; Tiquisate, breeding, April 9-12, 1946; San José, April 1946 and 1947; Finca Helvetia, April 11-14, 1947; Finca Valle-Lirios, March 23-25, 1947; Lake Atescatempa, April 25-27, 1946, April 17-20, 1947.

In literature it has been recorded from: Escuintla, Retalhuleu, Volcán de Fuego, Zapote (Salvin and Godman); Maranjo, San José (Ridgway); Hacienda California near Ocós (Griscom).

Habits and Hunting.--See the general notes on pigeons.

80. Columba rufina pallidicrissa Chubb

Pale-vented Pigeon

Other Names.--

Guatemalan: paloma espumuy, torcaza

Status.--The pale-vented pigeon is reported to be a relatively uncommon resident.

Description.--About the size of a red-billed pigeon but paler in coloration, chin white, abdomen very pale gray, wing coverts and upper back more extensively purplish.

Adult male.--Forehead and forecrown vinaceous blending to gray on back of crown and nape, glossed with metallic green and bronze; sides of head light gray; chin and upper throat white, darkening to gray on lower throat; neck and breast vinaceous or purplish brown, fading to pale gray on lower abdomen and under tail coverts; back and scapulars vinaceous brown, glossy; rump and tail gray; bill black, iris orange-red, legs and feet red.

Adult female.--Similar but duller.

Measurements.--

Male (38)		Female (21)	
Wing,	169.5 - 190 (180.9)	Wing,	164 - 189 (177.2)
Tail,	105 - 123 (114.7)	Tail,	101 - 122 (111.4)
Tarsus,	22.5 - 27 (24.9)	Tarsus,	23.5 - 26 (24.7)
Culmen,	15 - 20 (17.1)	Culmen,	15 - 18.5 (16.9)

General Distribution.--Southern Mexico from Chiapas and Vera Cruz south over Central America to northern Colombia.

Distribution in Guatemala.--Humid Tropical Zone forests of the Caribbean lowlands.

Records.--This species was not observed during the survey.

In literature it has been recorded from: Río Dulce, Sayuchil, Cubilguitz (Salvin and Godman); Los Amates (Dearborn); Puerto Barrios (Griscom); Remate (Van Tyne).

Habits and Hunting.--This pigeon apparently is not sufficiently common or numerous to be of importance as a game bird.

81. Columba fasciata fasciata Say

Band-tailed Pigeon

Other Names.—
Guatemalan: paloma torcasa, tucumusha, paloma de la montaña
English : mountain pigeon, bandtail

Status.—The band-tailed pigeon is a fairly common resident in the highland oak and pine forests.

Description.—A large pigeon, tail bluish with a broad black band.

Adult male.—Head, neck, and underparts purplish red, fading to white on belly and abdomen; nape with a distinct white half-collar, below which is a patch of metallic bronze-green; back and scapulars dark brownish, blending to slate blue on wing coverts; rump, upper tail coverts, and sides of body slate blue; tail bluish gray, paler toward the end on top and much paler below, crossed at middle by a black band; bill yellow tipped with black, iris reddish with surrounding skin brighter red; legs and feet yellow.

Adult female.—Head grayer, back, wings, and tail as in male, white collar and iridescent patch on hind neck obscure or lacking; underparts much less purplish, browner; bill, legs, and feet less yellow than in male.

Measurements.—

Male (38)	Female (28)
Wing, 195 - 221 (208.6)	Wing, 193 - 218 (204)
Tail, 122 - 151 (139.4)	Tail, 121 - 149 (134.1)
Tarsus, 24.5 - 29.5 (27)	Tarsus, 24 - 28.5 (26)
Culmen, 16 - 20 (18)	Culmen, 15.5 - 19.5 (17.6)

General Distribution.—Mountainous parts of western North America, México, and northern Central America from Vancouver Island, southwestern British Columbia, Montana, and western North Dakota south to northern Lower California and Honduras.

Distribution in Guatemala.—Chiefly in Temperate Zone pine and oak forests from elevations of about 3,500 to 8,500 feet.

Records.—Los Encuentros, March 1, 1946; Nebaj, April 24-27, 1947; San Pedro Jocopilas, April 22-23, 1947; near Sacapulas, April 30, 1947; Quiché, April 22, 1947; above Panajachel, March 1 and May 1, 1946; Chiul, near Nebaj, April 24, 1947; Tecpán, March 1, 1946; Calel, Totonicapán, May 3, 1947, and at several other places between Chiantla and San Carlos Sija; Mataquescuintla, May 21, 1947; San José Pinula, March 15, 1946, and May 22, 1947; Cumbre de Chicuy south of Chiquival, Totonicapán, May 3, 1947.

In literature it is reported from: Cobán, Volcán de Fuego, Tolimán (Salvin and Godman); Tecpán (Dearborn); Momostenango, Finca La Primavera thirty miles southwest of Cobán, La Montañita fifteen miles north of El Rancho, Tecpán, Finca La Primavera fifteen miles south of Cobán (Griscom); Sierra Santa Elena, November 21, 1946; Los Encuentros November 24, 1936 (Wetmore).

Habits and Hunting.—The band-tailed pigeon is an important game bird of the highlands, especially in the oak and pine forests. In late autumn and winter, it gathers in flocks and affords good sport for the hunters. The best shooting is near grain fields and wild fruit trees where the band-tailed pigeons are feeding.

82. Columba speciosa Gmelin

Scaled Pigeon

Other Names.—
Guatemalan: paloma abado, paloma
English : spotted pigeon

Status.—The scaled pigeon is reported to be an uncommon and local resident in the Petén.

Description.—Size of red-billed pigeon; neck spotted with white and brown all around, and broadly scaled with metallic black; underparts whitish or pale purplish brown, scaled with dark brown, abdomen white.

Adult male.—Reddish brown above; a broad band of glossy, metallic purple to bronze or green feathers with light centers across the lower throat, foreneck, and upper chest, and extending above to form a cape across the hindneck and upper back; back and rump chestnut; tail grayish brown and black; legs and feet purplish, bill red with white tip.

Adult female.—Similar to adult male but with band on breast and cape less glossy and whiter; underparts without purplish tinge; back and rump brown.

Measurements.—

Male (42)	Female (13)
Wing, 170 - 195.5 (185.2)	Wing, 169 - 181.5 (175.4)
Tail, 93.5 - 117.5 (103.8)	Tail, 97 - 111 (103.5)
Tarsus, 22.5 - 26 (24.4)	Tarsus, 21 - 24.5 (23.4)
Culmen, 18 - 23.5 (19.7)	Culmen, 16.5 - 21 (19.2)

General Distribution.—Greater part of tropical America from Oaxaca and Vera Cruz, south over Central and South America to Peru, eastern Bolivia, Matto Grosso and Santa Catharina; Island of Trinidad.

Distribution in Guatemala.—Humid Tropical Zone forests of the Petén.

Records.—This species was not observed during the survey.

In literature it has been recorded from: Sakluk (now called La Libertad), Lake Petén (Salvin and Godman), Chuntuquí (Van Tyne).

Habits and Hunting.—Reports indicated that this forest pigeon is not sufficiently numerous to be of much importance as a game bird.

83. Columba nigrirostris Sclater

Short-billed Pigeon

Other Names.—

None known.

Status.—The short-billed pigeon is reported to be a common resident in forests of Vera Paz and El Petén.

Description.—Slightly smaller and more slender than the red-billed pigeon; sexes similar except female duller in coloration. Above wood brown; below vinaceous, paler on chin and throat; crown and hindneck with strong purplish tone, paler vinaceous on sides of head and neck; bill short and black, iris pink to red, legs and feet red.

Measurements.—

Male (34)	Female (14)
Wing, 152 - 168 (160.8)	Wing, 152 - 163 (156.9)
Tail, 105 - 122 (113.1)	Tail, 104 - 113 (110.4)
Tarsus, 19 - 23 (21)	Tarsus, 19.5 - 22 (20.7)
Culmen, 12.5 - 14.5 (13.6)	Culmen, 12.5 - 15 (13.6)

General Distribution.—Southern Mexico from Oaxaca and Vera Cruz south over the lowlands of Central America to the Canal Zone.

Distribution in Guatemala.—Humid Tropical Zone forests of the Petén, Caribbean coastal area, and Vera Paz.

Records.—Panzós, May 17-18, 1947.

In literature it has been recorded from: Vera Paz, Choctum (Salvin, 1866, 206); Puerto Barrios, Los Amates (Dearborn); Secanquim, Finca Sepacuité, Chimoxán (Griscom); Macanché, Remate (Van Tyne).

Habits and Hunting.—The short-billed pigeon seems to be too few in numbers to be of importance as a game bird. Like several of the other pigeons present in the Caribbean forests, it does not occur sufficiently near centers of population to be accessible to many hunters.

84. Zenaidura macroura carolinensis (Linnaeus)

Eastern Mourning Dove

Other Names.—
Guatemalan: huilota, guirguira, guira, arrozera, paloma mensajera
English : dove, mourning dove

Status.—The mourning dove is an abundant winter visitant and migrant, especially in the highlands. Specimens of both carolinensis and marginella have been collected, but it seems probable that most of these doves are the western subspecies.

Description.—A medium sized, small-headed, slender, brownish dove; tail of graduated feathers, middle tail brown, outer ones broadly tipped with white.

Adult male.—Head and neck brown with bluish tinge, sides of neck with bronze and red metallic iridescence, a violet-black spot under ear coverts; upperparts, including middle tail feathers, grayish blue shaded with brown; underparts purplish brown, buffier on belly and abdomen, more bluish on sides and under wings, chin whitish; wing brown with conspicuous black spots on some of wing coverts and scapulars; tail with feathers graduated in length, middle pair brown and longest, lateral feathers bluish, with subterminal black bar, the outer four broadly tipped with white; bill small and black, iris brown, eye ring blue, legs and feet red.

Adult female.—Slightly smaller than male, browner and paler by comparison, head and neck with less iridescence and bluish coloration.

Measurements.—

Male (24)	Female (15)
Wing, 138 - 153 (147.2)	Wing, 135 - 146 (139.6)
Tail, 120 - 162.5 (142.3)	Tail, 96.5 - 137 (120.4)
Tarsus, 19.5 - 22 (20.6)	Tarsus, 19 - 21 (19.6)
Culmen, 13 - 15 (13.6)	Culmen, 12 - 14 (13)

General Distribution.—Breeds in eastern North America (east of the Great Plains) from Wisconsin, Michigan, southern Ontario, central New York, southern Maine, New Brunswick and Nova Scotia, south to the Gulf coast and Florida; Bahama Islands. Winters chiefly south of the Ohio and Potomac Rivers, casually to eastern México and Central America.

Distribution in Guatemala.—Tropical to Temperate Zones, very common on the Pacific coastal plain, in the highlands and interior arid valleys.

Records.—The following records are for the species and probably indicate the general distribution of both subspecies:

Lake Amatitlán, March 8, 1942; February 28, March 9, 25, and 29, 1946, April 17-20, 1947; Progreso (Dept. of Jutiapa), April 25 and 27, 1946; Chiquimulilla, March 26, 1946; Cerritos, March 27, 1946; San José, February 28, 1946, April 3, 1947; Escuintla, March 26, 1946; Tiquisate, April 9-12, 1946; Finca Helvetia, April 13 and 14 1947; Sololá, March 1, 1946; Panajachel, May 1, 1946, May 31, 1947; San Lucas Tolimán, May 3, 1946; Patzicia, May 4, 1946; Chimaltenango, March 2, 1946; Guatemala, February 28, March 9 and 25, April 7, 8, and 14, 1946, several records in April and May 1947; San Marcos, March 4, 1942; San Pedro Jocopilas, April 22-23, 1947; Sacapulas, April 23-24, 27, 1947; Trujillo, Zacapa, May 6, 1947; Cabañas, Zacapa, May 8, 1947; Alotenango, March 1942; Desconsuelo, March 1942; Chiul, near Nebaj, April 24, 1947; Nebaj, April 26, 1947.

It is reported by local hunters to be common all through the highlands where grain is cultivated.

In literature it is recorded from: San Martín de Quetzaltenango, Dueñas (Salvin and Godman); Gualán to El Rancho (Dearborn); La Montañita (Griscom); Volcán de Agua near Alotenango, November 5, 1936; La Alameda near Chimaltenango, November 7, 1936; Barranca Honda near Alotenango, November 2, 1936; Panajachel, November 11, to 15, 1936; Desconsuelo, November 24, 1936 (Wetmore). Specimens from the first two localities listed by Wetmore were identified by him as the western form marginella.

Habits and Hunting.—The mourning dove is a common winter resident and migrant to agricultural fields and savannas of the Republic, especially in the highlands. Old pastures, fields of grass and weeds, and stubblefields are favorite habitats. During winter months they are gathered in flocks, are fat, and provide excellent sport shooting.

85. Zenaidura macroura marginella (Woodhouse)

Western Mourning Dove

Other Names.—
See preceding subspecies.

Status.—The western mourning dove is a common winter visitant and migrant, as mentioned in the preceding comments under carolinensis. It is probably much more abundant than the latter (carolinensis).

Description.—See that of the preceding subspecies. They are indistinguishable except to an expert.

Measurements.—

Male (29)		Female (10)	
Wing,	142 - 156.5 (149.4)	Wing,	132.5 - 152 (143.2)
Tail,	121 - 158 (138.4)	Tail,	117 - 158 (127.3)
Tarsus,	19 - 21.5 (20)	Tarsus,	18 - 20.5 (19.2)
Culmen,	12.5 - 14.5 (13.7)	Culmen,	13 - 15 (13.8)

General Distribution.—Breeds in western North America from British Columbia, Saskatchewan, and Manitoba south to south-central Lower California, most of temperate México, Oklahoma, and western Arkansas. Migratory only in the northern part of the breeding range, but occurs in winter south to western Panamá.

Distribution in Guatemala.—Believed to be about the same as that of the preceding subspecies.

Records.—See the preceding subspecies.

Habits and Hunting.—See the preceding subspecies.

86. Zenaida asiatica asiatica (Linnaeus)

Eastern White-winged Dove

Other Names.—
Guatemalan: paloma ala blanca, ala blanca, calentura (Petén)

English : whitewing

Status.— The eastern white-winged dove is a common but local resident of the Tropical Zone woodlands. Its numbers are greatly increased during late autumn, winter, and early spring by the presence of migrants and winter visitants from México and Texas.

Description.—Larger and stouter than the mourning dove, with a conspicuous white band across the wing.

Adult male.—Top of head and back of neck purplish, a velvet-black spot below ear coverts; back, rump, and middle tail feathers brown; wing with conspicuous white band especially on middle coverts, flight feathers dark brown; throat and breast brown, latter with strong vinaceous cast, belly and sides bluish gray, abdomen whitish; tail somewhat rounded, outer feathers gray basally with broad white tips; bill black, iris orange red to red, eye skin blue, legs and feet red.

Adult female.—Similar to male but slightly smaller; crown brown; less iridescence in coloring.

Measurements.—

Male (40)		Female (31)	
Wing,	144.5 - 166 (156.3)	Wing,	142 - 161 (151.4)
Tail,	97 - 115 (103.4)	Tail,	84.5 - 106.5 (98.1)
Tarsus,	23.5 - 26 (24.7)	Tarsus,	22 - 25.5 (23.7)
Exposed culmen,	18 - 22.5 (19.7)	Exposed culmen,	17.5 - 21.5 (19.3)

General Distribution.—Southern Bahama Islands, Cuba, Jamaica, Hispaniola, Old Providence Island; lower Río Grande Valley in Texas south over eastern México to the Isthmus of Tehuantapec, thence southward over both slopes of Central America to Nicaragua.

Distribution in Guatemala.—Breeds locally on the Pacific coastal plain and in the Caribbean lowlands. During the months of October to April, or longer, migrants and winter visitants occur locally in the interior.

Records.—Records were obtained at the following localities: Cerritos, March 26-29, 1946; Brito, Escuintla, migrating flocks, March 26, 1946; Taxisco, Santa Rosa, March 26, 1946; Masagua, February 28, 1946, and March 19, 1947; Santa Lucía Cotz, March 9, 1942; San José, migrants, February 28, April 3, 1946, March 31, April 5, 1947; Naranjo, March 31, 1947; Tiquisate, migrants, April 8, 9, and 13, 1946; Mazatenango, April 9, 1947; Atescatempa, April 25-27, 1946; April 17-20, 1947; Finca Helvetia, migrants, April 10-14, 1947.

In literature it has been recorded from: San José (Salvin and Godman); Hacienda California (Griscom); island opposite Puerto Barrios, December 14, 1936 (Wetmore).

Habits and Hunting.—During autumn, especially in October and November, there are heavy flights of migrants from Mexico which pass along the Pacific coastal plain, enroute to wintering grounds in Guatemala, El Salvador.

87. Zenaida asiatica mearnsi (Ridgway)

Western White-winged Dove

Other Names.—
Same as the preceding subspecies.

Status.—The western white-winged dove is a very common resident of many localities in the more arid parts of the Tropical, Subtropical, and Temperate Zones.

Description.—Similar to the preceding subspecies from which it differs chiefly in being slightly larger, and in averaging paler and grayer in coloration.

Measurements.—

Male (30)	Female (19)
Wing, 152 - 171.5 (164.3)	Wing, 150 - 170 (158.9)
Tail, 101.5 - 121.5 (114.7)	Tail, 95 - 116 (105.6)
Tarsus, 23.5 - 26.5 (25.5)	Tarsus, 22 - 26 (24)
Exposed culmen, 18.5 - 23.5 (22.5)	Exposed culmen, 19.5 - 24 (22)

General Distribution.—Southern Lower California, southern Arizona, and southwestern New Mexico, south over western and central Mexico to Guerrero and Puebla; Tres Marías Islands.

Distribution in Guatemala.—Dry forests of the Arid Tropical, Subtropical, and lower Temperate Zones, in the interior valleys, hills, and mountains, from elevations of a few hundred feet up to 9,000. This subspecies apparently does not occur as a breeder on the Pacific or Caribbean coastal plains.

Records.—Progreso, Jutiapa, breeding, March 14, 1942; Jalapa, March 14, 1942; Lake Amatitlán, March 24, 1946; Antigua, March 10, 1942; February 9, 1947; Chimaltenango, March 2, 1946; May 4, 1946; June 1, 1947; Patzún, breeding, March 6, 1942; March 1, 1946; May 3-4, 1946; June 1, 1947; Tecpán, March 1, 1946; Sololá, March 4, 1942; March 1, 1946; April 22, 1947; Santa Cruz Quiché, April 22, 1947; San Pedro Jocopilas, April 22-23, 1947; Sacapulas, breeding, April 23-24, 30, 1947; Chiul, near Nebaj, April 24, 29-30, 1947; Chiantla, Huehuetenango, April 30 and May 2, 1947; Salamá, May 14 and 19, 1947; San Juan Sacatepequez, May 26, 1946, 1947; Motagua Valley, from Zacapa to El Progreso, March 26, 1942, May 6-9, 1947; Sanarate, El Progreso, May 9, 1947; Sumpango, March 6, 1942, March 2, 1946, May 4, 1946, June 1, 1947; Villa Nueva to Lake Amatitlán, March 31, 1947; Río Plátanos near San Antonio, El Progreso, May 6, 1947.

In literature the following records listed as asiatica probably pertain to Zenaida asiatica mearnsi rather than to the preceding subspecies. It is likely that some migrant asiatica occur in a few of these places, but the resident form is mearnsi. Records are as follows: Sololá, Volcán de Auga, Dueñas, San Gerónimo east of Salamá (Salvin and Godman); El Rancho, Tecpán (Dearborn); Sacapulas, Antigua, Chanquejelve, Panajachel, Progreso (Griscom); Zacapa, December 3, 1936 (Wetmore).

Habits and Hunting.—The western white-winged dove is more widely distributed over the Republic than the eastern subspecies, but apparently does not occur in such large flocks during the period October to March. For hunters living in the highlands, the western whitewing is more available since it occurs in nearby mountain woodland. The heaviest flights, though, are on the Pacific coastal plain and are of the eastern form. To a hunter, both kinds look alike.

88. Scardafella inca (Lesson)

Inca Dove

Other Names.—
Guatemalan: tortolita, tortolita sola estoy, conguita
English : yard dove, scaled dove

Status.—The Inca dove is a very common resident within its range.

Description.—A small, long-tailed gray dove with many scale-like feathers; several bright chestnut feathers in wing. Adults grayish brown above, pale lavender gray below blending to buffy on the belly and abdomen, nearly all of the plumage with black margins to feathers producing a scaled appearance, less distinct on breast; wing with coverts and primaries chestnut, ends blackish, wing lining chestnut and black; tail with middle feathers brown, three lateral ones basally gray, then black, then tipped broadly with white; bill blackish, iris reddish, legs and feet flesh pink.

Measurements.—

Male (20)	Female (29)
Wing, 86 - 96 (90.7)	Wing, 87.5 - 95.5 (90.1)
Tail, 85 - 103 (93.7)	Tail, 85 - 102 (93.2)
Tarsus, 15 - 16.5 (15.8)	Tarsus, 15 - 16.5 (15.7)
Exposed culmen, 11 - 14 (12.5)	Exposed culmen, 11.5 - 13.5 (12.4)

General Distribution.—Breeds from Texas, Louisiana, southern Alabama, and South Carolina south through México and the West Indies to Peru, northern and eastern Argentina, and the Rio Grande do Sul. Migratory in the northern part of its range in the United States.

Distribution in Guatemala.—Drier, more open country, from the arid Tropical Zone to the Temperate Zone, from sea-level to above 8,000 feet. Especially common around habitations.

Records.—Palín to San José, February 28, 1946; March 31 and April 7, 1947; San José Acatempa to Lake Atescatempa, April 17, 1947; Lake Atescatempa, March 15, 1942; April 25-27, 1946; April 17-20, 1947; Sacapulas, April 24 and 30, 1947; Chichicastenango, April 22, 1947; Chiul, near Nebaj, April 24, 29, and 30, 1947; Chajul, April 27, 1947; Cotzal, April 29, 1947; Motagua Valley, Zacapato El Rancho, March 26, 1942; Trujillo, Zacapa, breeding, May 6, 1947; Cabañas, Zacapa, nesting, May 8, 1947; Progreso, El Progreso, May 9, 1947; Salamá to Panzós, May 15, 1947; Tactic to El Chol, May 19, 1947; El Chol to Guatemala, May 20, 1947; Tiquisate, April 9-12, 1946; Chiquimulilla, March 25, 1946.

In literature this species has been recorded from: San Gerónimo, Choctum, Dueñas, Petén (Salvin and Godman); El Rancho, Gualán (Dearborn); San José (Ridgway); San José, Ocós, Progreso, Finca La Primavera, Hacienda California, Huehuetenango, Finca El Espina, San Antonio (Griscom).

Habits and Hunting.—This small, friendly dove, so common in farmyards and around fincas, should be fully protected by law.

89. Columbigallina passerina pallescens (Baird)

Mexican Ground Dove

Other Names.—
Guatemalan: tortolita, tortola gemidora
English : red-winged dove

Status.—The Mexican ground dove is a common though locally distributed resident throughout its range.

Description.--A very small, stout, short-tailed dove; feathers of neck and breast with scale pattern.

Adult male.--Head with forehead, sides, and neck purplish red, glossed with bluish on occiput and hindneck; upperparts grayish brown; underparts with purplish red cast, paler or grayer on belly and abdomen, many feathers on throat and breast with dark centers giving a scale pattern; wing with coverts pale vinaceous brown, their upper surface with iridescent steel blue-black spots, flight feathers dark brown on outer webs, bright chestnut on inner webs; tail with middle feathers brownish gray, outer ones blacker, outermost with narrow white tips; bill orange red with dark tip, iris reddish, legs and feet flesh pink.

Adult female.--Differs from the male in being grayer, with much less vinaceous cast to plumage.

Measurements.--

Male (20)	Female (10)
Wing, 83 - 91 (87)	Wing, 84 - 90 (86.5)
Tail, 57 - 63 (59.5)	Tail, 57 - 62 (59)
Tarsus, 15 - 16 (15.6)	Tarsus, 15 - 16 (15.7)
Exposed culmen, 11 - 12 (11.5)	Exposed culmen, 11 - 12 (11.5)

General Distribution.--Colorado Delta, southern Arizona and southern Texas south over Lower California and México (Except the tableland) to Belice (British Honduras) and Guatemala.

Distribution in Guatemala.--Chiefly dry, open highlands of the interior.

Records.--Villa Nueva, February 28, 1946, March 31, 1947; Lake Atescatempa, March 15, 1942, April 25-27, 1946, April 17-20, 1947; Progreso, Jutiapa, March 14, 1942, April 25 and 27, 1946; Asunción Mita, March 14, 1942, April 25 and 27, 1946; Jutiapa, March 14, 1942, April 25 and 27, 1946; Lake Amatitlán, February 28, March 9, 25, and 29, 1946, March 14 and 31, April 8, 1947; Panajachel, March 1, 1946, April 22, 1947; Patzicia, March, 1942; March 1, May 1, 1946; April 22, 1947; San Pedro Jocopilas, April 22-23, 1947; Sacapulas, April 23 and 30, 1948; Motagua Valley, from Zacapa to Progreso, March 26, 1942, May 6 to 9, 1947; Salamá to Tactic, May 15, 1947; Tactic to Panzós, May 15, 1947; Panzós, May 16-18, 1947; El Chol to Guatemala, May 29, 1947.

In literature it has been recorded from: Dueñas, San Gerónimo, Panajachel, Santa María, near Quetzaltenango (Salvin and Godman); Gualán, Lake Atitlán (Dearborn); Dueñas, Toyabaj (Ridgway--should be spelled Joyabaj); Panajachel, San Lucas, Antigua, Sacapulas (Griscom); Antigua, Dueñas, Panajachel (Wetmore).

Habits and Hunting.--The little Mexican ground dove should be fully protected. It is too small and friendly to be considered a game bird.

It is especially common along roads in the vicinity of villages and fincas.

90. Columbigallina talpacoti rufipennis (Bonaparte)

Ruddy Ground Dove

Other Names.--

Guatemalan: tortola corralera, tortolita
English : red dove (male)

Status.--The ruddy ground dove is a very common resident within its range.

Description.--A very small ground dove; the male reddish in color, crown bluish gray.

Adult male.--Above reddish brown, top of head brownish gray, paler and strongly vinaceous on forehead and hindneck; wings reddish brown with two black bars, wing lining reddish chestnut; middle tail feathers cinnamon brown, others darker; chin and upper throat whitish, blending to vinaceous buff on underparts; iris red, bill pale with dark tip, legs and feet reddish.

Adult female.--Similar except buffy brown above and lacking the vinaceous coloring.

Measurements.—

Male (53)
Wing, 83.5 - 94 (89.2)
Tail, 57 - 69.5 (63.2)
Tarsus, 15 - 17.5 (16.4)
Exposed culmen, 12 - 13.5 (12.8)

Female (37)
Wing, 83.5 - 92 (87)
Tail, 55 - 66.5 (61)
Tarsus, 15 - 17 (16)
Exposed culmen, 11.5 - 13.5 (12.5)

General Distribution.—Southeastern México from central Vera Cruz southward; all of Central America; northern South America south to the Magdalena Valley in Colombia and east to northern Venezuela; Margarita Island and islands of Trinidad and Tobago.

Distribution in Guatemala.—Chiefly in the arid Tropical Zone in open or semi-wooded country of the Pacific lowlands, but also locally in the interior, ranging at least to 4,500 feet.

Records.—Cerritos, March 26-29, 1946; Chiquimulilla, March 26-29, 1946; Escuintla to San José, February 28, 1946; March 31, 1947; San José, March 31-April 6, 1947; Iztapa, April 2, 1947; Finca Valle-Lirios, March 23-25, 1947; Escuintla to San Antonio, Suchitepequez, April 8, 1947; Patutul, April 8, 1946; Tiquisate, April 9-12, 1946; Mazatenango, April 9, 1947; Lake Atescatempa, March 15, 1942; April 25-27, 1946; April 19-20, 1947; La Tinta, Alta Vera Paz, May 15, 1947; Panzós, May 18, 1947.

In literature this species has been recorded from: Petén, Dueñas, Paraiso, Retalhuleu (Salvin and Godman); Los Amates, San José (Dearborn); Pantaleón, in Escuintla, Finca El Ciprés, Hacienda California, Ocós, San José Chimoxán (Griscom); Flores, Pacomón (Van Tyne).

Habits and Hunting.—Similar to the preceding species.

It is especially common along roads, and the trails bordering fields and farms.

91. Columbigallina minuta interrupta (Griscom)

Guatemala Ground Dove

Other Names.—

Guatemalan: tortolita

Status.—The Guatemalan ground dove is reported to be an uncommon and local resident within its range.

Description.—Slightly smaller and grayer than the ruddy ground dove; breast plain.

Adult male.—Above grayish brown blending to bluish gray on forehead and hindneck; wings with two rows of blue-black spots, inner vanes of longer primaries reddish brown, wing lining mostly reddish chestnut; middle pair of tail feathers plain brownish gray, unbarred, the others banded with black and tipped narrowly with white; below vinaceous buff, paler on throat and abdomen; bill gray, iris pale yellowish brown, feet and legs pink.

Adult female.—Similar to male but with vinaceous coloring replaced by grayish brown.

Measurements.—

Male (10)
Wing, 71 - 78 (74)
Tail, 48 - 55 (50.5)
Tarsus, 15 - 16 (15.6)
Exposed culmen, 10 - 11 (10.6)

Female (10)
Wing, 71 - 79 (74)
Tail, 47 - 52 (50)
Tarsus, 15 - 16 (15.4)
Exposed culmen, 10 - 11 (10.7)

General Distribution.—Southeastern México in states of Vera Cruz, Tabasco, and Campeche; Guatemala; Belice (British Honduras).

Distribution in Guatemala.—Tropical Zone, chiefly open woodland, on both coastal plains, in the Petén and Vera Paz.

Records.--San José, February 28, 1946, April 4, 1947; Cerritos, March 26-29, 1946; Chiquimulilla, March 26, 1946; Tiquisate, April 9-12, 1946; Los Arcos, Escuintla, March 22, 1947; Finca Valle-Lirios, Escuintla, March 23, 1947.

In literature this species has been recorded from: Retalhuleu (Salvin and Godman); Petén, Los Amates, Yzabal, Virginia Plantation near Puerto Barrios (Ridgway); Secanquim, Chimoxán, Finca Chamá, Chipoc (Griscom).

Habits and Hunting.--Like the several preceding species, this ground dove is too small to be considered a game bird.

92. Claravis pretiosa (Ferrari-Perez)

Blue Ground Dove

Other Names.--
Guatemalan: tortola azuleja, tortolita azul, tortola splomada
English : blue dove

Status.--The blue ground dove is apparently an uncommon and local summer resident or visitant. It may be resident throughout the year on the Caribbean slope of Guatemala.

Records in El Salvador indicate that it is common from January through June, but absent for the remainder of the year.

Description.--Slightly larger than the Inca dove but with a shorter tail; the male bluish.

Adult male.--Body bluish gray, whitish on forehead, back dark bluish gray, wings with black markings, wing lining pale bluish gray; middle tail feathers dark gray, others black; bill greenish, feet and legs pink; iris yellowish.

Adult female.--Buffy brown above, grayish on forehead; wing markings chestnut; middle tail feathers brown, under tail coverts russet; chin and throat white; foreneck and breast pale brown, underparts even paler posteriorly; middle tail feathers chestnut, outer blackish.

Measurements.--

Male (36)	Female (23)
Wing, 107.5 - 118 (112.3)	Wing, 104 - 118 (110.9)
Tail, 70 - 82.5 (76.2)	Tail, 71 - 80.5 (75.1)
Tarsus, 16.5 - 19.5 (18.1)	Tarsus, 16 - 22 (18.2)
Exposed culmen, 12.5 - 15.5 (14)	Exposed culmen, 12.5 - 14.5 (13.8

General Distribution.--Southeastern México from southern Tamaulipas southward over the Caribbean rain forest area of Central America to Nicaragua, thence south over both eastern and western slopes to Peru, Bolivia, northern Argentina (Tucumán), Paraguay, and southern Brazil.

Distribution in Guatemala.--Chiefly in the Tropical Zone forests of the Caribbean drainage, ranging to 1,500 feet; also recorded at two localities on the Pacific coastal plain.

Records.--Tiquisate, April 12 and 13, 1946; La Tinta, Alta Verapaz, May 15, 1947; Panzós, May 18, 1947.

In literature this species has been recorded from: "sources of the Río de la Pasión," Yzabal, Choctum, Retalhuleu (Salvin and Godman); Los Amates (Dearborn); Finca Chamá, Chimoxán (Griscom); Uaxactún (Van Tyne).

Habits and Hunting.--The blue ground dove is usually observed in or near woodland, but in some localities is found in brushy country.

It is too scarce, as well as too small, to be considered a game bird.

93. Claravis mondetoura salvini Griscom

Mondétour's Ground Dove

Other Names.--
None known.

Status.—Mondétour's ground dove is a very rare and local resident, recorded from only three or four localities in the Republic.

Description.—Slightly larger than the Inca dove; foreneck and chest dark brown; two conspicuous dark bars on the wing coverts; lateral tail feathers broadly tipped with white or pale grayish brown.

Adult male.—Head with forehead pale gray darkening to slate gray on upperparts; chin and upper throat white; lower throat, foreneck and chest dark reddish brown, blending to slate gray on lower breast, sides, and flanks; abdomen and undertail coverts whitish; wing with outer webs of inner secondaries crossed by two broad bands of iridescent blackish; tail with middle feathers slate gray, others extensively grayish white toward tips, this area increasing toward outermost which has terminal half whitish; bill black, iris yellow to pink, legs and feet reddish.

Adult female.—Upperparts brown, wing spots or bands somewhat metallic purple instead of purplish black as in male; tail with middle feathers brown, others blackish, tipped with pale grayish brown; foreneck and chest paler than in male, averaging buffy brown, becoming darker on sides and flanks.

Measurements.—

Male (7)	Female (5)
Wing, 107 - 117 (112.4)	Wing, 110 - 118 (114.3)
Tail, 66 - 83.5 (77.6)	Tail, 71.5 - 82.5 (76.4)
Tarsus, 21 - 22.5 (21.8)	Tarsus, 21.5 - 23.5 (22.4)
Exposed culmen, 12.5 - 13.5 (13)	Exposed culmen, 12.5 - 15 (13.8)

General Distribution.—Subtropical zone of the mountains of Guatemala.

Distribution in Guatemala.—Recorded only in the high mountain forests above 5,000 feet.

Records.—This species was not observed during the survey.

In literature it has been recorded from: Calderas and Volcán de Fuego (Salvin and Godman); Volcán San Lucas (Griscom, 1930, 289).

Habits and Hunting.—This forest species is too rare to be considered a game bird.

94. Leptotila verreauxi fulviventris (Lawrence)

Buff-bellied Dove

Other Names.—

Guatemalan: espumui, ishcomui, ishpumui, paloma
English : wood dove

Status.—The buff-bellied dove is reported to be a very common resident within its range.

Description.—About the same size as a white-winged dove, sexes similar. Above brownish, very pale vinaceous gray on forehead, nape and hindneck with metallic, iridescent gloss; tail feathers, especially outer ones dark, with four outermost tipped with white; wing lining bright cinnamon rufous; underparts grayish with strong vinaceous cast, chin and abdomen white; bill black; iris orange yellow, skin around eye blue; legs and feet red.

Measurements.—

Male (4)	Female (9)
Wing, 142 - 145 (143.7)	Wing, 129.5 - 143 (137.8)
Tail, 98 - 103 (101.5)	Tail, 93 - 108 (98.1)
Tarsus, 28 - 31 (29.4)	Tarsus, 27 - 29 (28.1)
Exposed culmen, 15.5 - 17 (16.1)	Exposed culmen, 15 - 17.5 (16.4)

General Distribution.—Southern México, including the Yucatán Peninsula, south to eastern Guatemala and Belice (British Honduras).

Distribution in Guatemala.—Tropical Zone, Caribbean drainage, also north and east of the Pacific Cordillera divide.

Records.—Lake Atescatempa, March 15, 1942; April 25-27, 1946; April 18-20, 1947; Progreso, in Jutiapa, March 13 and 14, 1942; Mataquescuintla, May 22, 1947; Patzún, March 5, 6, and 28, 1942; March 1 and May 1 and 3, 1946; May 31, 1947; Antigua, March 10, 1942; Panajachel, March 5, 1942; May 2, 1946, May 31, 1947; San Lucas Tolimán, May 3, 1946; Nebaj, April 26, 1947; Sacapulas, April 23, 1947; Progreso, El Progreso, May 6 and 9, 1947; Trujillo, Zacapa, breeding, May 6, 1947; Cabañas, Zacapa, May 8, 1947; Motagua Valley, several records from Zacapa to El Rancho, March 26, 1942; Tactic to El Chol, May 19, 1947; El Chol to Guatemala, May 20, 1947.

In literature this form has been recorded from: San Gerónimo, Dueñas, Barranco Hondo, Tolimán, Panajachel (Salvin and Godman); Los Amates, Gualán, Lake Amatitlán, Atitlán, Tecpam (Dearborn); Chichicastenango, Finca La Primavera, Sacapulas, Progreso (Griscom); Flores, Pacomón (Van Tyne).

Habits and Hunting.—This solitary dove is common along roads through woodland. When flushed its rapid flight toward woodland cover requires quick shooting.

95. Leptotila verreauxi bangsi Dickey and van Rossem

El Salvador White-fronted Dove

Other Names.—
See preceding form.

Status.—The El Salvador white-fronted dove is a very common resident throughout its range.

Description.—Similar to the preceding subspecies but darker on the back.

Measurements.—
See the preceding subspecies.

General Distribution.—Pacific slope of Guatemala, Salvador, and Nicaragua, extending into western Honduras.

Distribution in Guatemala.—Tropical Zone woodland of the Pacific slope.

Records.—San José, March 8, 1942; February 28, 1946; April 1-6, 1947; Tiquisate, April 9-12, 1946; Palín to Escuintla to San José, February 28, 1946; March 31, 1947; Escuintla to Acatenango, March 9, 1942; February 28, 1946; Patulul, April 8, 1946; Santa Lucía Cotz, April 8, 1946; Pantaleón, Escuintla, March 9, 1942; Finca Valle-Lirios, March 23-25, 1947; Iztapa, April 2, 1947; Cerritos, March 26-29, 1946; Chiquimulilla, March 26, 1946; Finca Helvetia, April 11-14, 1947; Mazatenango, April 14, 1947.

In literature it has been recorded from: Retalhuleu and the Pacific Coast (Salvin and Godman); San José, Patulul (Dearborn); Ocós, Hacienda California, La Carolina, Finca El Ciprés (Griscom).

Habits and Hunting.—Similar to the preceding subspecies.

The unusual song of this dove consists of three notes, the last of which is the only one heard at a distance. It is low in pitch and is suggestive of the sound made by blowing across the top of an empty bottle.

96. Leptotila plumbeiceps plumbeiceps (Sclater and Salvin)

Bonaparte's Dove

Other Names.—
Guatemalan: paloma de la montana, paloma

Status.—Bonaparte's dove is believed to be a rare and local resident within its range.

Description.—Similar in size to the white-fronted dove, with the back of the head and neck slate gray, in decided contrast to the brown of the back. Sexes similar though female averages duller in coloration.

Forehead grayish white or pale bluish gray; cheeks, lower throat, foreneck, and chest vinaceous buff, blending to white on upper throat and chin, pinkish on breast, white on lower abdomen; upperparts plain olive brown, the upper back sometimes faintly glossed with purple in male; wing with axillars and under coverts cinnamon red; tail with middle feathers brown, others darker toward tips, the three outer pairs tipped with white; bill black, legs and feet red.

Measurements.--

Male (16)		Female (7)	
Wing,	129 - 145 (137.8)	Wing,	128 - 144 (133.6)
Tail,	84 - 98 (89.8)	Tail,	81 - 96 (87.3)
Tarsus,	27 - 32 (30)	Tarsus,	27.5 - 31 (29.6)
Exposed culmen,	15 - 17.5 (16)	Exposed culmen,	14.5 - 18 (15.5)

General Distribution.--Southeastern México from southern Tamaulipas, south over Belice (British Honduras), eastern Guatemala, Caribbean slopes of Honduras and Nicaragua and the west coast of Costa Rica.

Distribution in Guatemala.--Tropical rain forests of the Caribbean drainage.

Records.--Panzós, May 16-18, 1947.

In literature this species has been recorded from: Vera Paz (Sclater and Salvin, 1868, 59); Choctum (Salvin and Godman); Los Amates (Dearborn); Chuntuquí, Sacchich (Van Tyne).

Habits and Hunting.--This forest dwelling dove is large enough, but apparently is too scarce to be a good game bird.

97. Leptotila cassini cervinventris (Sclater and Salvin)

Vinaceous-breasted Dove

Other Names.--

Guatemalan: paloma morada

Status.--The vinaceous-breasted dove is reported to be a fairly common, though often local, resident within its range.

Description.--Slightly smaller than the white-fronted dove; sexes fairly similar. Above olive brown, forehead whitish to pale gray, purplish cast to gray hindneck; wing lining cinnamon; the outermost tail feathers black at ends with white tips; chin and throat white, neck and upper breast pale purplish to bluish gray, belly with vinaceous cast, lower abdomen white; iris yellowish, skin around eye red, bill black, legs and feet red.

Measurements.--

Male (24)		Female (21)	
Wing,	126 - 139 (132.2)	Wing,	124.5 - 138 (130.8)
Tail,	77 - 96 (86.7)	Tail,	72 - 99 (84.5)
Tarsus,	29 - 34 (31.2)	Tarsus,	29 - 32 (31)
Exposed culmen,	13.5 - 16 (15)	Exposed culmen,	13.5 - 16.5 (15.1)

General Distribution.--Caribbean lowlands of Guatemala south through Belice (British Honduras), Honduras, and Nicaragua to northwestern Costa Rica on the west and to the Chiriqui Lagoon, Panamá, on the east.

Distribution in Guatemala.--Tropical Zone forests of the Caribbean drainage.

Records.--This species was not observed during the survey.

In literature it has been recorded from: Vera Paz (Sclater and Salvin, 1868, 59); Choctum (Salvin and Godman); Secanquim, and Finca Chamá (Griscom).

Habits and Hunting.--This large ground dove is reported to be sufficiently common in some localities to be of significance as a game bird. There is no information to indicate the extent to which it is utilized.

98. Oreopeleia montana (Linnaeus)

Ruddy Quail-dove

Other Names.—

Guatemalan: espumuy, paloma de la montaña, paloma colorada, paloma cantora
English : wood dove, ruddy dove

Status.—The ruddy quail dove is a fairly common but local resident of suitable forests within its range.

Description.—About the size of a quail; stout in build.

Adult male.—Above reddish chestnut, forehead paler, hindneck and back with faint metallic purplish cast; a broad cheek stripe of pinkish-cinnamon, bordered by chestnut below and blending with the hindneck; throat pale cinnamon, neck and breast dark vinaceous buff, paler posteriorly; bill red with darker tip; iris, skin around eye purplish red; legs and feet red.

Adult female.—Above light olive brown, forehead paler.

Measurements.—

Male (86)	Female (55)
Wing, 131 - 149.5	Wing, 127 - 145 (136.6)
Tail, 64.5 - 89 (77)	Tail, 65 - 84 (73.7)
Tarsus, 26 - 31 (27.9)	Tarsus, 25 - 29.5 (27.4)
Exposed culmen, 10 - 13.5 (12.3)	Exposed culmen, 8 - 13.5 (11.2)

General Distribution.—The greater part of tropical America from Sinaloa on the west and Vera Cruz on the east, south over México, Central America, and South America to Peru, northeastern Bolivia, Western Matto Grosso, Paraguay and Rio Grande do Sul; Greater Antilles: Cuba, Isle of Pines, Jamaica, Hispaniola, Puerto Rico, St. Thomas (?); Lesser Antilles: Granada; Island of Trinidad.

Distribution in Guatemala.—Tropical Zone rain forest, both Caribbean and Pacific drainages.

Records.—Finca Helvetia, April 10-13, 1947; Chajul, El Quiché, April 27, 1947.

In literature it has been recorded from: Vera Paz, Choctum, Savana Grande (Salvin and Godman); Secanquim (Griscom); Uaxactún (Van Tyne).

Habits and Hunting.—The ruddy quail dove, an inhabitant of the dense forests, is too difficult to stalk to be considered a good game bird by most hunters.

99. Oreopeleia albifacies albifacies (Sclater)

White-faced Quail-dove

Other Names.—

Guatemalan: espumuy de la montaña, paloma de los altos.

Status.—This dove is an uncommon and local resident within its range.

Description.—A large, stout dove, slightly larger than the preceding species, underparts light brown, upperparts rich chestnut brown; inner webs of wing feathers without any rufous.

Head with forehead whitish blending to pale gray on crown and darker gray on nape; hindneck brown, sides of neck similar but feathers with pale tips, lower hindneck with bronze gloss; upperparts chestnut, the back somewhat glossed with bluish violet; tail with lateral feathers having pale tips and darker subterminal band; lower foreneck dark grayish buff deepening to wood brown on chest and upper breast; sides and flanks light buffy cinnamon; middle abdomen whitish; bill black, iris orange red, legs and feet red.

Measurements.—

Male (12)	Female (8)
Wing, 144.5 - 161 (151.2)	Wing, 140 - 157.5 (148.7)
Tail, 89 - 106 (95.3)	Tail, 80.5 - 102.5 (91.2)
Tarsus, 40 - 44 (41.2)	Tarsus, 39 - 44 (40.7)
Exposed culmen, 14 - 15.5 (14.6)	Exposed culmen, 13-16.5 (14.8)

General Distribution.—Southeastern México in the States of Vera Cruz and Oaxaca; northeastern Guatemala.

Distribution in Guatemala.— Subtropical Zone rain forests of Vera Paz and of highlands to the northward.

Records.—In literature: forests of Vera Paz, Choctum (Salvin and Godman)

Habits and Hunting.—The white-faced quail dove is too solitary to be of appreciable value as a game bird.

100. Oreopeleia albifacies anthonyi Griscom

Guatemalan White-faced Quail-dove

Other Names.—
Guatemalan: espumuy de la montaña, paloma de los altos.

Status.—This race of white-faced quail dove is apparently an uncommon and local resident within its range.

Description.—Similar in general to that of the preceding subspecies albifacies. The present form is described as being somewhat darker and having the back of the head brownish instead of gray; forehead more buffy; breast browner than albifacies.

Measurements.—
Similar to those of the preceding subspecies.

General Distribution.—Mountains of southeastern Chiapas and the Pacific Cordillera of Guatemala.

Distribution in Guatemala.—Subtropical Zone rain forests of the Pacific Cordillera.

Records.—San Lucas, May 3, 1946.
In literature: Rio de la Cuesta, San Marcos; El Rincon, San Marcos; San Martín; Atitlan; Savana Grande; Volcán de Fuego (Salvadori, 1893, also Salvin and Godman); Volcán Tajumulco, San Marcos (Hellmayr and Conover); San Lucas (Griscom).

Habits and Hunting.—This quail dove is too solitary in habit to be of much value as a game bird.

Species not Recorded from Guatemala but which Are Believed to Occur There

The following birds have been recorded in nearby localities of México, El Salvador, or Honduras.

The sedentary species, such as the quail, probably occur in contiguous parts of Guatemala.

Those which are migratory, such as the shorebirds, undoubtedly visit localities on the coasts of the Republic enroute to the more southern places where they have been recorded.

101. Colinus virginianus minor Nelson

Least Bobwhite

Other Names.—
Guatemalan: codorniz, perdix
English : quail, bobwhite

Status.—Hypothetical. This species may be a local resident in grasslands adjacent to the plains of Palenque, México; however, it has not yet been recorded in Guatemala.

Description.—A small quail (wing about 93 mm.) with tail less than three-fifths as long as the wing; scapulars, tertiaries and rump spotted with blackish; crest inconspicuous except when raised.

Adult male.--Head striped with black and white, sometimes mostly black; chin and throat pure white, not at all buffy; this white area completely surrounded by a black band; abdomen rufous brown, unbarred, but streaked heavily with black and more or less spotted with white; breast and upper abdomen cinnamon, the feathers edged with black; under tail coverts spotted with white. Bill blackish, iris dark brown, legs and feet grayish.

Adult female.--Similar in general to the male except that the white on the head and throat is replaced by buff and the underparts are grayish, heavily barred with blackish.

Measurements.—

Male (5)	Female (1)
Wing, 90.5 - 96.5 (93)	Wing, 95.5
Tail, 45 - 50.5 (48.2)	Tail, 46
Tarsus, 25 - 27.9 (26)	Tarsus, 26.5
Culmen from base, 13.8 - 15.6 (14.3)	Culmen from base

General Distribution.—Grassy plains in the northeastern part of Chiapas and adjacent portion of Tabasco; probably also neighboring sections of Guatemala.

Distribution in Guatemala.—Not yet recorded in the Republic, but probably occurs in western part adjacent to plains of Palenque. Tropical Zone.

Records.--There are no records for Guatemala as yet. It is included in the present list since it occurs very near the Guatemala boundary, in the State of Chiapas, México.

102. Colinus virginianus salvini Nelson.

Salvin's Bobwhite.

Other Names.—
Guatemalan: codorniz, perdiz
English : quail

Status.--Hypothetical. This subspecies may be a locally common resident in grasslands adjacent to the coastal plain of Chiapas, México, but as yet it has not been recorded in Guatemala.

Description.—About the size of C. v. minor; it is the darkest of the various geographic races.

Adult male.--Similar to C. v. insignis, except darker; more grayish, brownish above, throat somewhat streaked with black, underparts with much more blackish.

Measurements.—

Male (7)	Female (3)
Wing, 91.5 - 96 (93.8)	Wing, 93 - 96.5 (94.3)
Tail, 48.5 - 53.5 (51.1)	Tail, 45.5 - 49 (46.8)
Tarsus, 26 - 28.3 (26.9)	Tarsus, 26.5 - 27.3 (26.9)
Culmen from base, 14.5 - 15.8 (15.2)	Culmen from base, 14.5 - 15.5 (15.0)

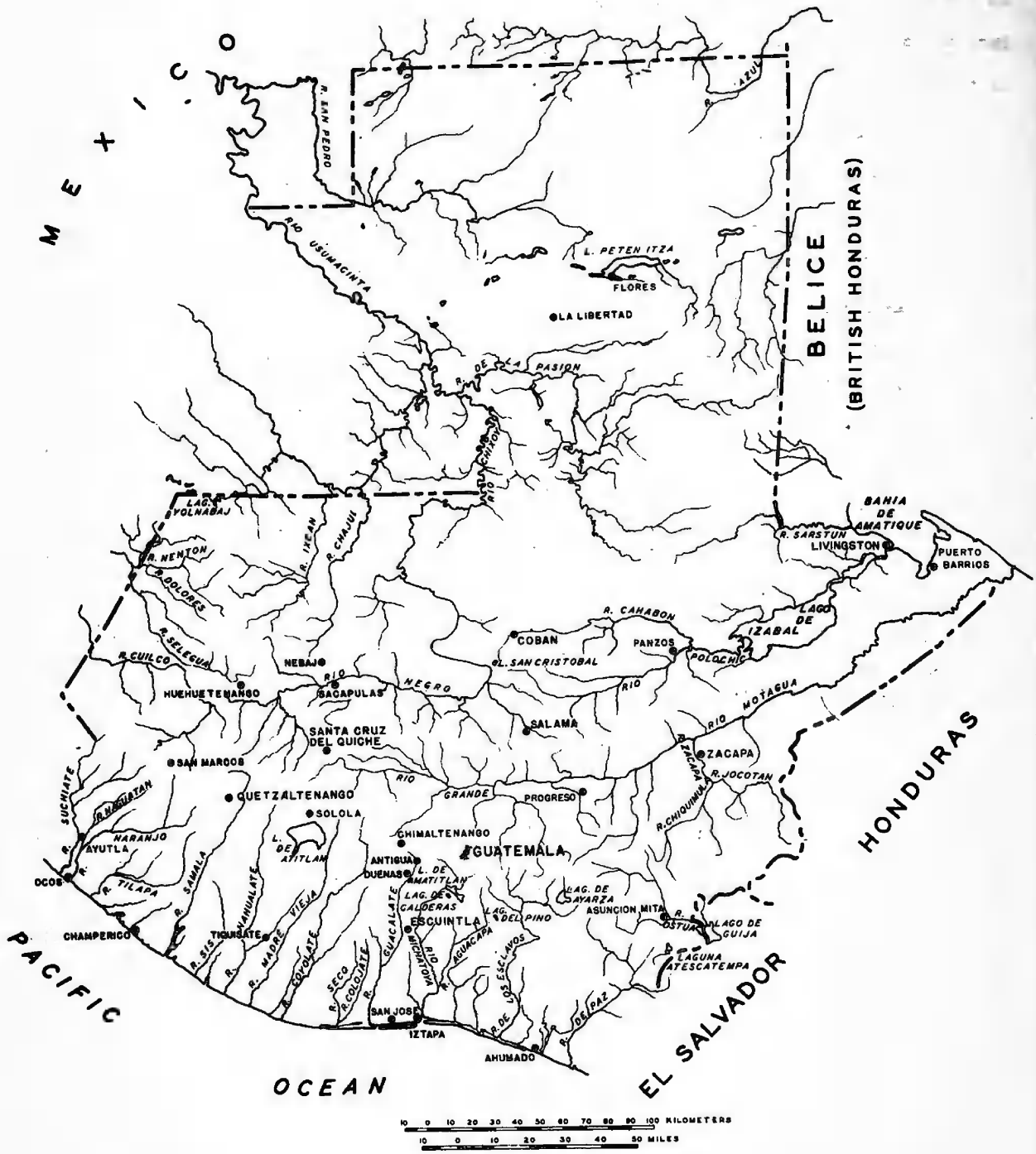
General Distribution.—Coastal plains of southern Chiapas near the Guatemala border.

Distribution in Guatemala.—Hypothetical as yet, since no specimens have been taken. Probably occurs in grassland areas of the Pacific coastal plain adjacent to Chiapas.

Records.—None reported for Guatemala. It is included in the present list since it occurs very near the Guatemala boundary in the State of Chiapas, México.

Specimens of the following shorebirds have not yet been taken in Guatemala, but these species undoubtedly occur there since they are known to winter in countries to the south of the Republic. They are probably regular migrants, especially along the Pacific Coast. However, since specimens have not yet been obtained, they are included in the hypothetical list.

Charadrius wilsonia wilsonia Ord	Wilson's Plover
Tringa solitaria cinnamomea (Brewster)	Western Solitary Sandpiper
Limnodromus griseus scolopaceus (Say)	Long-billed Dowitcher
Calidris canutus rufus (Wilson)	American Knot
Ereunetes pusillus (Linnaeus)	Semipalmated Sandpiper
Erolia fuscicollis (Vieillot)	White-rumped Sandpiper
Erolia bairdii (Coues)	Baird's Sandpiper



MAP OF GUATEMALA

Prepared by
U.S. FISH AND WILDLIFE SERVICE
June 1948

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RECOMMENDATIONS FOR THE DEVELOPMENT OF THE FISHERY RESOURCES OF GUATEMALA

BY

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Introduction

The objectives of the fishery investigations were to determine the species of fishes present, their relative abundance, food habits, and the amount of utilization; to evaluate pool, riffle, cover, spawning grounds, and food conditions; and to make physical and chemical observations in order to determine the suitability of specific waters for fishery developments; to discover the factors involved in developing and increasing the utilization of the fishery resources; and finally, to make suggestions for fishery developments and for the formulation of stocking and management policies.

The methods employed in the investigations were dictated by limitations imposed by the mode of travel and by the available time. Waters were observed from a boat, or visited by truck wherever circumstances permitted. Seines, traps, hook-and-line fishing, and poisons were used for sampling the fish populations. Data were collected on the acidity or alkalinity, carbonates, temperatures, bottom foods, extent of areas in deep and shallow water, and on pool, riffle, and cover conditions.

To my colleagues, Dr. Robert R. Miller, Assistant Curator, Division of Fisheries, U. S. National Museum and Senor Julio Midence, assistant and interpreter, both of whom were with the author throughout both expeditions, much credit is due for the success of the work. Dr. Robert R. Miller's knowledge and assistance in the identification of fishes in the field was indispensable. Without his constant interest and inexhaustible energy, much less would have been accomplished. Senor Julio Midence contributed immeasurably to expediting the work of the mission. Seldom is the privilege granted of working with one who combines the many admirable qualities of friendly fellowship, humor, and proficiency in expediting the planned program. I am indebted to Dr. George B. Saunders, Chief of the mission for his kindly suggestions and help in editing the manuscript and assistance given during the expeditions.

Fish Management Problems in the Fresh Waters of Guatemala

The purpose of fish management is to produce the maximum number of desirable fish, with as much utilization as is commensurate with a sustained annual yield. The basic conception that a body of water will support a definite weight of fish has become so well established as to be axiomatic. This weight depends on such factors as fertility, temperature, length of growing season, and the combination of species present, granted that they are suitable to the purposes and habitats involved. Fertility, temperature, and length of growing season are factors that usually are impracticable to control in most streams and large lakes. The combination of species often can be controlled by planting the appropriate kinds and numbers. Other well established methods, such as fishing regulations, when properly applied, assist in maintaining a balance between the predatory and nonpredatory species, as well as between the desirable and nonuseful species.

The recommendations for introductions and the species to be propagated in this case have been based primarily on the principles of fish management developed in the United States during the past 50 years. One of the primary facts in an understanding of these principles is that most fishes in their proper environment have a very high reproductive potential. Unless a high percentage of the young are devoured by large fish and other predators, or reduced in numbers by some other factor, the water supports a population of

small fish and does not provide the quantities of large fish desirable for angling and food. The most satisfactory fishing is usually obtained where sufficient predatory fishes are present to feed on the young, and where man utilizes enough of the larger ones to keep the fish population sufficiently reduced in numbers to permit rapid growth. Otherwise, the fishes may grow so slowly that the major portion of them die of old age before they reach a desirable size for angling and food. In the Southern United States most game and food fishes die a natural death by the time they have completed three years of life. In most species, less than three to five per cent of the individuals live long enough to begin their fourth year of life.

Our observations of the fishes in the waters of Guatemala indicate that the same principles apply there for the desirable food fishes such as the mojarras (Cichlasoma) have a high reproductive potential as indicated usually by tremendous numbers of small individuals and a limited number of sizes suitable for food. It is believed that the overpopulation results also from the small number of predator fishes of sufficient size to be effective in interior waters. Exceptions to this rule occur in Lago Izabal and other waters near the coast, including the coastal lagoons of the Pacific area. In the fresh waters of the coastal areas, anadromous fishes such as the robalos (Centropomus), sharks (Carcharhinus), sabalo (Tarpon), and others perform the necessary predation, in part at least.

The most useful species to man are those which are satisfactory as food and sport because of large size, palatability of flesh, and habits that make them easily captured by inexpensive and readily obtainable gear. It is the author's belief that the low utilization of the inland fisheries of Guatemala is due primarily to the fact that there are few excellent game fishes that can be caught readily and in quantity by hook-and-line fishing. With the exception of the guapote, and two or three of the other mojarras (Cichlasoma), Guatemalan fresh-water fishes cannot be taken readily by hook-and-line fishing. It is true that the robalo and some of the other anadromous forms that occur in the lowland waters are excellent sport fishes when hooked, but they are rather difficult to take, except at certain periods of the year.

Species Recommended for Introduction

For reasons given below, it is recommended that introductions of exotic species be made only in Lago Atitlan and Rio Motagua in the immediate future. If these trial introductions prove successful, other introductions could be made as outlined in the report.

The introduction of a species of fish into a water where it does not occur often produces results not anticipated. In most instances, such introductions have been made without knowledge of the fishes already present, and without knowledge of the habitat or of the ecologic relationship that must be established between predatory and nonpredatory fishes in order to develop and maintain a fish population most suitable for man's use. The successful introduction of fishes involves four important considerations, namely: the ecologic relationship between predators and the fishes they take principally as food; whether sport or food fishes are desired; the type of habitat involved; and the selection of fishes that are adapted to the habitat and purpose for which the introduction is made. When species never before associated together are introduced in the same water, only a guess can be made as to their success in complementing each other and satisfying man's purposes. Hence, common sense dictates that introductions be made on a closely limited basis, and the results used as an index of the desirability of similar introductions in other waters. Accordingly, recommendations for planting of exotic species other than those for Lago Atitlan and Rio Motagua must be regarded as provisional and subject to change.

For developing the resources of Lago Atitlan, we have recommended the introduction of smallmouth bass (Micropterus dolomieu), and the black crappie (Pomoxis nigro-maculatus). Lago Atitlan was chosen because it is an interior drainage where the introduced fishes cannot escape to other waters.

The smallmouth bass, (Micropterus dolomieu), is similar to the largemouth bass but suitable for cool water such as that in Lagos Atitlan and Ayarza, and the more rapid streams where gradients are between one-half and five meters per kilometer. It does not grow as large as the largemouth bass, but is excellent sport and food fish.

The black crappie (Pomoxis nigro-maculatus) is recommended for several waters other than Lago Atitlan because of the need for additional predacious species that will contribute large quantities of food for local inhabitants. It commonly reaches sizes of one-half kilogram or more and is an important and highly desirable food fish in the United States. It is easily caught by hook-and-line fishing or by traps. The young occur in large numbers and contribute quantities of food for the bass. After the crappie reaches a length of five to seven centimeters it becomes predacious and competes with the basses as a predatory species.

Rio Matagua was chosen as a test stream for the introduction of the channel catfish (Ictalurus lacustris punctatus), because it is isolated from other drainages by salt water, and is typical of the hundreds of miles of streams throughout the Republic.

The southern channel catfish (Ictalurus lacustris punctatus) is recommended for many of the streams because it is adapted to murky waters, and to habitats containing deep pools with rock ledges and undercut banks. It grows rapidly and reaches a weight of 15 kilograms or more. The species is easily caught in baited traps and by angling. It is believed that this species has the best possibilities of contributing to the food supply in areas where suitable streams exist. This catfish is considered to be one of the most important and desirable food fishes produced in streams of the Mississippi River Valley.

Two native species are recommended for introduction into other waters. One of these is the guapote (Cichlasoma motaguense) which is said to have been introduced into Laguna de Amititlan, where it furnishes successful fishing for large numbers of anglers. It also occurs in the waters of the Pacific coastal plain. It is recommended for planting in a number of lakes due to its size (reaching one to two kilograms), and the fact that it can be caught readily by angling. It is not a game fish by any measure of imagination, but is a satisfactory food fish. It has never been propagated but its spawning habits are similar to one of its relatives, Herichthys cyanoguttatus (Rio Grande perch), which reproduces well in rearing ponds.

The chumbimba (Cichlasoma maculicauda) of Lago Izabal is a native species recommended for introduction in other inland lakes because of its size of about one-half kilogram, palatability, and reported ease of capture by angling. It has not been introduced elsewhere or propagated, and little is known of its breeding habits. We can assume with some confidence that its breeding habits do not vary materially from that of related forms of the Cichlidae.

If the introduction of smallmouth bass is successful, and if the species is well liked for its food and sport value, it may be desirable to introduce the largemouth bass (Micropterus salmoides) into certain warm-water lakes and sluggish streams, types of habitat to which it is admirably suited. This species is similar to the smallmouth bass, (Micropterus dolomieu), but it reaches a larger size and is better suited to warm waters such as those in the lowlands of Guatemala. Both basses are predacious feeders, and should be of great help in cropping small fish, thus permitting the production of more large fish of usable size. In fertile warm waters of the United States, the largemouth bass reaches one-half kilogram in weight within one year, and commonly attains a size of 5 kilograms.

Streams

Factors Determining the Value of Streams

Streams in Guatemala have their source in springs or surface runoff, or a combination of the two. The character of the surface soil, subsoil, and underlying rock have an important bearing on the amount and kinds of plant and animal life available for fish foods, for they affect the character of the pools, the type of bottom, gradient, amount of soil erosion, and chemical content of the water. The amount of rainfall, its seasonal occurrence, and the types and amounts of vegetation covering the watershed also have important effects on the aquatic organisms. Before recommendations can be made for developing the aquatic resources of a stream, a knowledge of its size, gradient, water volume, turbidity, alkalinity, temperature, pools and shelter, types and amount of aquatic vegetation, fish foods, fishes and other types of aquatic organisms are important if one is to have assurance of success.

The stream data listed in Tables 1 and 2 are summaries of the important information collected at points where streams were examined. The "Pool Grade" column in Table 1 represents a classification of pool conditions according to quality. Pool Grade A represents stream sections consisting of 50 per cent or more of pools providing excellent shelter for fishes by reason of depth, boulders, overhanging banks, logs, and abundant vegetation. Pool Grade B represents stream sections consisting of 25 to 50 per cent of pools providing cover of average to excellent quality. Pool Grade C is applied to stream sections that have less than 25 per cent of pools providing average to excellent cover, or a higher percentage of total stream area in pools of poor quality. The pool classification is based primarily from the amount of cover, but depth of the water is important, for if other conditions are equal, shelter is provided in direct ratio to depth and turbidity. For most warm-water fishes, the ideal situation is a stream consisting of 50 to 80 per cent or more of pools, with depths of one and one-half meters or more.

The riffle composition is listed because of the importance of riffles as a habitat for insects, crustacea, and other groups of organisms which provide an important portion of the fish foods. The quantity of organisms found in the different types of bottom is usually highest in silt (organic debris and soil) and decreases in the following order: rubble (rocks 7.5 to 30 centimeters in diameter), boulders (30 centimeters or larger in diameter), bedrock (solid rock) and sand (rock particles less than 0.25 centimeter).2/

Bottom fauna was collected with a square-foot bottom sampler in a number of streams with different types of riffle bottoms. Samples taken from riffles consisting predominantly of rubble, gravel, and boulders usually averaged more than two grams per square foot (an area 30.48 centimeters square), while those taken from riffles with large amounts of sand interspersed with rubble and gravel averaged about one gram. Samples taken from streams with sandy bottom averaged less than one gram per square foot. The shrimp (Palaemon carcinus) and the crab (Potamocarcinus guatemalensis) occur in nearly all streams. As these forms were not easily taken in the bottom sampler, but were observed with a light at night to occur in moderate numbers, it may be assumed that the bottom fauna is represented in considerably greater quantity than could be measured. Because of the amount of time utilized in taking bottom samples and measuring the organisms, and the knowledge that the results were not representative, only a limited number of streams were sampled for the bottom fauna. Except in the slow flowing coastal streams, where stream bottoms consist almost wholly of sand, bottom food organisms are adequate to be classified as rich. In addition to the fauna of the stream bottoms, fishes also feed upon smaller fish, terrestrial insects, frogs, toads, and other organisms that live in the stream or fall into it. Since the waters are warm throughout the year, many of the fishes such as the live-bearers, Poeciliidae, reproduce the year around. The other animals that fish feed upon have no dormant season as in colder climates. Consequently, the continuous growing season and adequate supply of food should make for an abundance of fishes, unless other unfavorable factors limit production.

The Pacific coastal plain has approximately one meter of rainfall annually. Rainfall on the lower mountain slopes of the Pacific drainage is two meters, and three or four meters on the higher mountain slopes. Much of the north slope has no more than one meter, and some sections in the Motagua Valley have considerably less. Parts of Vera-Paz, the Polochic and Sarstun drainages, and the north coastal areas have precipitation ranging from two to as much as five meters. With some localized exceptions, most of the rain falls between May 15 and November 15 each year. The abundance of rainfall beginning in May and terminating in November, with its resulting erosion and silting, followed by the long dry season, limits the stream areas in which the fishery resources can be developed profitably. During the dry season, most of the small highland streams and some of the large ones as well as many of the smaller streams of the southern lowlands, become dry or reduced to small flows.

Soon after the rainy season begins, the streams become a chocolate brown color as a result of the heavy load of silt. As the rainy reason continues, the streams clear in some degree, but remain turbid, for the most part, throughout the rainy reason. Near the

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2/ Instructions for conducting stream and lake surveys by H. S. Davis, fishery Circular No. 26. U. S. Department of Commerce, Bureau of Fisheries, Washington, D. C.

termination of the rainy reason, there is some intensification of the silt load, because of the drying of the soil for several days between rains. During the dry season, the streams remain clear except in a few localized areas that receive rain throughout the year.

Since the description of individual streams would demand a voluminous and repetitious report, the treatment of stream conditions has been divided into three main divisions: one pertaining to drainages of the Pacific Coast, a second to streams flowing into the Caribbean Sea, and a third to streams flowing into the Gulf of México. For the purposes of brevity and ease in comparison, many of the data have been placed in Tables 1, 2, and 3.

Streams Flowing into the Pacific Ocean

With the exception of Río de los Esclavos, these streams were too inaccessible to permit the collection of information suitable for a description of each drainage. The streams in the highlands were much more accessible than those elsewhere, and, since there is much uniformity in coastal plain and piedmont areas, these streams will be discussed under the three geographic areas.

The highland streams, for the most part, are not well suited to the development of fishing. The Río Grande de Mita and the Río de los Esclavos are exceptions in that they appear to have conditions suitable to the development of fishing with the channel catfish (Ictalurus lacustris punctatus) and the smallmouth bass (Micropterus dolomieu). The Río Grande de Mita was examined only at the town of Asuncion Mita. The Río de los Esclavos was observed at several points between the town of Esclavos and Casillas. These stream sections consist of a series of rapid riffles covered with gravel, rubble, and boulders, and long, quiet and rather deep pools. The stream gradients fall within the requirements of smallmouth bass (0.5 to 5 meters per kilometer). The same is true of the temperature of the water. The numerous rock ledges and undercut banks should provide excellent habitat and spawning areas for channel catfish. Both streams have an abundance of bottom organisms and small fish to support bass and channel catfish. The fishes are pepesca (Astyanax), plateada (Roeboides), filin (Rhamdia), butes and pupos (Profundulus, Mollienisia, and Poecilistes), cuatro-ojos (Anableps), and five species of mojarras (Cichlasoma). These fishes are little utilized by man due to their small size. Seldom do the mojarras grow longer than 15 centimeters, and the other species are smaller.

Fishes introduced into Río Grande de Mita probably will become established in Lake Guija, part of which is in Guatemala and part in El Salvador. According to information available, the species recommended would not be undesirable fishes for Lake Guija.

Río Aguacapa has considerable area in its headwaters that probably would support smallmouth black bass. The smaller tributaries are fed by innumerable small springs that provide an abundant flow throughout the dry season. Bottom foods and small fish are abundant, but many sections of the stream have gradients too steep for best production of smallmouth bass. If they are introduced, it is expected that they will distribute themselves in the reaches of suitable gradient, and provide fishing in such areas. The areas utilized will change somewhat when the water volume is increased or decreased.

Río Michatoya below Lago de Amatitlán and above Escuintla does not have a rich bottom fauna, because of large amounts of fine volcanic rock, but some fishing can be provided in this area with smallmouth bass and channel catfish. The gradient in most areas falls within the limits of suitability for smallmouth bass. The numerous rock ledges and undercut banks should provide a fair habitat for channel catfish.

As far as we know, there are no other streams in the highlands flowing into the Pacific Ocean that have sufficient volume during the dry season to permit the development of a fishery resource. The small streams on other drainages that flow during the dry season could be planted as an experiment after the more desirable streams have been developed. Only meagre results can be expected from the experiment.

The piedmont is an area from 10 to 30 kilometers wide between the base of the mountains and the Pacific coastal plain. The lower limit of this area is about 100 meters in elevation, and the upper approximately 300 meters. In this area, there are approximately

37 streams of various sizes in which fishing can be improved. All are crossed by the highway from Chiquimulilla going westward through Escuintla, Mazatenango, to Ayutla and Malacatan, near the Mexican boundary. For our purpose, these streams may be distinguished by their rapid riffles of gravel, rubble, and boulders as contrasted with the sandy-bottom streams of the coastal plain. In the upper reaches of the piedmont area, most streams have gradients greater than five meters per kilometer and the pools are of poor quality. In the middle and lower reaches, the gradient is usually less than five meters per kilometer, the pools of high quality, and fish foods moderately abundant. These streams maintain satisfactory flows through the dry season, and appear to present possibilities for the development of sport fishing with the smallmouth bass. The numerous rock ledges and abundant cover present water areas that appear well suited to channel catfish, particularly in the areas where gradients are below about three meters per kilometer. The better streams in this area are as follows from east to west: Río de los Esclavos, Pajal, Aguicapa, Achihuate, Coyolate, Madre Vieja, Zanjon de la Arena, Moca, Cutzan, Panan, Nagualate, Tilapa, Nil Naranjo, Nahuatan, Cabus, and Petacalapa. Río Suchiate was not observed above Ayutla, but there is reason to believe that it is suitable for development in the piedmont area. The same is true of the larger tributaries of Río Suchiate.

These streams usually contain five species of mojarras (Cichlasoma). Three or more species of robalos (Centropomus) occur in the lower portion of the area, the abundance varying with the season. The tepsmechin (Agonostomus) occurs abundantly at certain periods in March and April in the faster waters of the upper piedmont. Other species of little value for food, but of value as forage for the larger fishes, are the pepesca (Astyanax), the plateada (Roeboides), the butes (Mollinenesia and Poecilistes), the cuatro-ojo (Anableps), and others.

The streams of the Pacific coastal plain, lying below the piedmont, have sandy bottoms, and velocities ranging from one to four centimeters per second. The velocities decrease materially near the coast, where the streams have many oxbows and marginal lagoons.

In the upper part of the coastal plain, the pools are shallow and provide little cover. Cover provided by undercut banks, logs, and overhanging vegetation increases as one travels toward the coast. The streams are always slightly murky from shifting sand, and the bottom fauna is meagre. Fish are not abundant in these sandy-bottom streams, and it is not expected that productive fisheries can be developed in them. They can support some fish, and fish produced in the lagoons and oxbow areas probably will frequent the rivers during the dry season, when the lagoons decrease in size.

It is believed that the channel catfish (Ictalurus lacustris punctatus) would provide more fishing than any other species. The largemouth bass (M. salmoides) also is recommended. It is particularly well adapted, it is believed, to the type of habitat found in the lagoons and the oxbow areas of the streams. During the rainy season, the water areas for these species in the lagoons is two or more times that available during the dry season. This enlarged habitat should permit excellent growth. Reduction of the size of the water areas during the dry season should be particularly favorable for fishing, as the fish will be concentrated.

Streams Flowing into the Caribbean Sea

Río Motagua Drainage

The source of the Río Motagua is in the vicinity of Santa Cruz Quiché, at an altitude of about 3,200 meters. The river flows eastward and then northeastward over a course of more than 400 kilometers, and empties into Bahia de Omoa at the border of Guatemala and Honduras. The drainage is largely from mountainous terrain consisting mainly of sandstone, but with occasional strata of limestone and shale. Except in the lower half, the watershed is badly eroded, with little vegetation covering it during the dry season.

Below Gualán, the higher slopes are covered by pine forests, and the valley vegetation in the lower reaches increases to dense tropical growth. The rainfall at the source of the drainage is near 74 centimeters annually, with approximately 65 centimeters falling during the months of May to October, inclusive. In the arid region of Progreso,

Zacapa, and Gualán probably it is less than half that amount. Below Gualán, the amount of precipitation increases rapidly toward the coast, and averages near 293 centimeters in the lower reaches of the drainages, with approximately 240 centimeters falling in the months of June to December, inclusive. The two forks that form the main stream in the vicinity of Santo Tomas have a combined flow of approximately 0.7 to 0.84 cubic meter (25 to 30 cubic feet) per second. Below the forks, additional tributaries join the river, forming a turbulent mountain stream with an average fall of about eight meters per kilometer. In the region of Concua, about 60 kilometers below Santo Tomas, the stream averages 23 meters in width, and had an estimated flow of 11.3 cubic meters (400 cubic feet) per second at the time observations were made. The gradient at Concua was estimated at 4 to 5 meters per kilometer. In this region, it has eroded a mountain valley more than 1,300 meters in depth.

Near the mouth of the tributary, Río Agua Calienta and about 30 kilometers below Concua, the gradient becomes less, and the percentage of pool area is increased above the approximate equal percentage of pools and riffles at Concua. The bottom changes from predominately boulders, sand, and rubble to sand and gravel; the clear water of greenish-blue color becomes slightly turbid due to shifting sand. Below Gualán the stream has many oxbows, a width of 75 meters, shallow pools of one to one and one-half meters, and a continuous flow over sandy bottoms devoid of aquatic vegetation. Near Tenedores, approximately 60 kilometers from its mouth, the stream is about 100 meters wide. At the time observations were made, it had an estimated flow of 16.9 cubic meters (600 cubic feet) per second. The stream averages about one foot in depth, and has few pools. The sandy bottom supports little aquatic vegetation, except occasional small beds of Gramineae along the shore margin. In many places, the banks are undercut, and are shaded by overhanging vegetation. The stream was not observed below Tenedores, but well-informed natives told us that its character changes little except near its mouth, where there is a swampy shoreline, deeper water, slow current, and a considerable amount of aquatic vegetation.

The stream contains three species of characins (Characinidae), six species of Poeciliidae, six or seven mojarras (Cichlidae), and 15 or more other species.

Spawning areas for smallmouth bass (Micropterus dolomieu) and largemouth bass (M. salmoides) are considered to be excellent above Agua Caliente. Below this point, spawning areas are available for largemouth bass, and the entire stream is suitable for channel catfish (Ictalurus lacustris punctatus). For the best utilization of habitat, smallmouth bass should be stocked above Río Agua Caliente and largemouth bass below. Channel catfish are recommended for the entire stream.

Tributaries of the Río Motagua.--There are a number of excellent tributaries entering the Motagua, but most of these were examined only at one or two points. Except the lower five kilometers of Rio Grande Rio Zacapa at Zacapa, these are mountain streams with boulders, rubble, and gravel, containing pools of average to excellent quality. Tributaries were examined as follows: South fork of Río Motagua at Chichicastengo, Rios Belejeya, Chol, Las Vacas, Purgatorio, Platanos, Agua Caliente, Morazan, Tato, Chimalapa, Riachenlo, Viejo or Sunsapote, El Hondo, Grande (Río Zacapa) at Zacapa, and Xuteque. Except in the upper reaches, where the streams are relatively small, most of the tributary waters have gradients within the normal limits for smallmouth bass.

For the best utilization of habitat, it is believed that the smallmouth bass (Micropterus dolomieu) and the channel catfish, (Ictalurus lacustris punctatus) should be introduced if these species prove to be successful in the trial plants elsewhere.

Río Polochic

This drainage arises in the vicinity of Tactic, Tamahu, and Purulha at altitudes of 1,200 to 1,500 meters. It has many characteristics of a rainforest in that the drainage is well covered by abundant tropical vegetation. Rainfall records taken at Tres Aguas at an altitude of 250 meters are suggestive of the average for the watershed, although precipitation is undoubtedly greater at higher altitudes. The records (Sapper, 1899) show an annual precipitation of 5,617 millimeters, with 125 to 215 millimeters falling monthly during the first four months of the year, 400 in May, 950 to 1,075 monthly during June, July and August, 675 in September, 490 in October, 260 in November, and 160 in December. Livingston, on the Gulf of Honduras at the lower end of the drainage, has an average yearly rainfall of 5,230 millimeters.

The upper reaches of Río Polochic have steep gradients, as indicated by a drop of 1,000 meters from Tamahu to La Tinta, a distance of about 16 kilometers. From La Tinta to Lake Izabal, a distance of more than 80 kilometers, the gradient drops less than 50 meters.

The water temperatures above La Tinta are too high for trout during periods of low water in the dry season. These periods may last a few days or weeks. The gradient in most of the stream above La Tinta is too great for best results with smallmouth bass (Micropterus dolomieu), but it is believed that more fishing will be obtained with this species than any other. In the vicinity of La Tinta and downstream to about five kilometers above Panzós, the stream presents an excellent habitat for this species. From about five kilometers above Panzós to Lake Izabal the stream is sluggish, with gradients of less than one-half meter per kilometer. The water in this area varies in depth from one to three or more meters. This area is suitable for the largemouth bass (Micropterus salmoides) and the crappie (Pomoxis nigro-maculatus). The bass should provide excellent sport, and the crappie should be instrumental in increasing food resources materially.

Rio Cahabon, a tributary of the Polochic, arises in the same general area as Rio Polochic but flows westward and northward to Coban, then eastward, entering Río Polochic about 15 kilometers below Panzós. From Tactic to its outlet, it drops about 1,400 meters in a course of approximately 110 kilometers, or an average of 13 meters per kilometer. According to a contour map of this area (Sapper, 1899), much of the upper and lower courses of the stream have gradients of less than five meters per kilometer. As the greater portion of the stream appears suitable for smallmouth bass, that species is recommended for introduction. It is believed also that channel catfish would provide considerable fishing in the upper and lower sections. The stream is murky for short periods after rains, and overhanging vegetation provides a type of habitat to which the channel catfish is adapted.

In addition to Río Cahabon, the tributaries Ríos Neuva (or Tres Aguas) and Semui are well suited to the smallmouth bass and channel catfish in their lower reaches, where stream gradients are moderate.

Streams Flowing into the Gulf of México

Río Usumacinta Drainage

That part of the drainage in Guatemala arises in the vicinity of Salamá, Rabinal, Cubulco, Santa Cruz Quiché, Momostenango, Huehuetenango, San Mateo, and Ixtatan at altitudes of 1,500 to 2,500 meters or more. Río Negro, the main headwater tributary, arises in the vicinity of Santa Cruz Quiché and flows a circuitous route through the valley east of Malacatan, eastward to the vicinity of San Cristobal, and then northward as Río Chixoy to the international boundary of México and Guatemala. It follows the international boundary to the western-most point of Departmento El Petén, where it enters the State of Tabasco, México, and eventually flows into the Bay of Campeche. The Río de la Pasion and Río San Pedro, which drain a large part of Peten, also are a part of this system. This drainage was examined in only a limited number of places in the highlands.

The Río Negro was observed from the air at certain points in the highlands and on the ground at Chixoy, Sacapulas, and in the valley east of Malacatan. Also, a few of the accessible tributaries were observed. Due to the very heavy silt load and the fact that the stream is murky during a large part of the year, fish foods are not abundant. Some cover is provided by rock ledges, but the stream presents a poor environment for fish. It is believed that some fishing can be developed with the channel catfish in areas above Sacapulas, where the gradient is not unduly steep. From about five kilometers below Sacapulas to 10 or 20 kilometers below Chixoy, the stream is a turbulent, swiftly flowing stream, too rapid to permit development of much fishing. Below this area, the gradient is more moderate, and it is likely that satisfactory fishing can be developed there.

The Río Rabinal and Río Salamá are mountain streams suitable for developing some fishing through the introduction of channel catfish. Some reaches of these streams have steep gradients, but in general they are less than five meters per kilometer. Smallmouth bass are not recommended for this drainage system, as more investigation in the lower reaches

of the drainage is needed. Río Aguacatan was examined below the spring and town of Aguacatan. The stream is large, and contains an abundance of cover; the gradient is steeper than five meters per kilometer, and fish foods occur in only moderate amounts. Although the temperature is 15 to 17 degrees Centigrade downstream from Aguacatan, the stream is subject to a great amount of flooding and silting during the rainy season. Trout would provide some fishing for several kilometers below Aguacatan, but it is believed that they would have to be stocked annually, for silting and rather uniformly high temperature would not be conducive to successful spawning.

Inland Lakes

Laguna de Amatitlán

Laguna de Amatitlán is located on the Pacific slope 28 kilometers south of Guatemala City at an altitude of 1,245 meters. The greatest width of the lake is about five kilometers; its length, about 13. It is divided into two basins by a railroad fill about 1,400 meters in length. The upper basin contains about six square kilometers, the lower about eleven, making a total of approximately 1,724 hectares. The greatest depth in the upper basin is 28 meters; and in the lower, 34. The benches or shallow inshore areas usually are not more than 10 to 15 meters wide, averaging about 12; and they extend to a depth of approximately 6 meters. Beyond the bench, the water increases rapidly in depth, and that part of the lake is utilized little by the present fish population. Nearly all of the northwest shore of the lower basin is steep, and the water reaches a depth of 10 to 20 meters or more at a distance of only four or five meters from shore. The bottom slopes more gently along the south shore, the rocky bench area extending 5 to 20 meters in width. The entire northeast shore and the upper basin have beds of tules (Typha and Scirpus) averaging 15 meters in width and extending out to depths of about two meters. There are also beds of Potamogeton, Ceratophyllum, and Chara growing in the tule beds, and often extending out to depths of six or more meters.

The fishes found in Laguna de Amatitlán were the pepesca (Astyanax), pescadito (Poecilistes), pupo (Mollienisia), serica (Cichlasoma nigrofasciatum), mojarra (C. guttulatum), and the guapote (C. motaguense). The pepescas, pescaditos, pupos, and sericas are all small fishes, usually reaching 3 to 15 centimeters in length. They are abundant in the shallow areas of the lake, along the beaches, and amongst the vegetation. The mojarra (C. guttulatum) is not common. It occurred in our seine and gill-net catches in the ratio of 1 mojarra to 70 guapotes.

Before the introduction of the guapote about 1934, the mojarra (C. guttulatum) was the only fish of usable size in the lake, and it was esteemed as a food fish. The introduction of the guapote is said to have increased the take of food fishes. Since the guapote is a more generalized feeder, the mojarra was not able to compete successfully with it. Stomachs of the mojarra contained large quantities of vegetation, mud, and some animal remains, while those of the guapote contained crustacea, principally Amphipoda, and small fishes, insects, et cetera, with some vegetation and mud. These two fishes occupy the bench areas of the lake, and were not taken in water deeper than about six meters. The best catches were made at depths of two or three meters. The largest guapote ever caught in Laguna de Amatitlan was said to be 42 centimeters long, weighing 1.9 kilograms. They usually do not exceed a weight of one kilogram, and the average is more nearly one-half kilogram.

Chemical Data.—The upper basin was examined at 11:00 a.m., March 9, 1946. The temperature of the air was 20 degrees Centigrade; the surface water, 23.3; and the bottom (15 meters) 22.3. Identical temperatures prevailed on March 15, 1947, at 10:00 a.m., Juday (1915), on February 5, 1910, found temperatures of 20 degrees at the surface and at 10 meters; 19.8 at 15 meters; and 19.6 at 20 and 34 meters in depth. At 5 meters, the water contained 6.8 parts per million of oxygen; and at 15 meters, 5.2 parts per million. On March 9, 1946, the Secchi disk (20 centimeters in diameter) disappeared at 3.04 meters; the phenolphthalein alkalinity was zero; the methyl orange alkalinity was 174 parts per million; and the pH, 8.1.

The lower basin was examined between 3:30 and 4:30 p.m., March 20, 1946. The air temperature was 24.4 degrees Centigrade; the surface water, 23.3; and the bottom (30 meters), 22.2 degrees. Oxygen was determined in parts per million as follows: 1 meter, 9.8; 5 meters, 6.2; 10 meters, 5.2; 15 meters, 4.2; 20 meters, 2.8; 25 meters, 3.4; and 30 meters, 4.8. The Secchi disk (20 centimeters in diameter) disappeared at 3.04 meters.

Meek (1908) gives the results of an analysis of water from Laguna de Amatitlan as follows:

Calcium carbonate	140.0 parts per million
Magnesium carbonate	27.3 parts per million
Sodium and potassium chlorides	210.0 parts per million
Potassium nitrate	2.0 parts per million
Total, including miscellaneous substances	421.0 parts per million

Amphipods, locally called "pulgas", are abundant and constitute an important food of the guapote. Shrimps or "camarones" (Palaemon carcinus) and crabs or "cangrejos" (Potamocarcinus guatemalensis) are common. The camarones and cangrejos are abundant near shore during the breeding season, which is said by Meek (1908) to be in April, May, and June for the camarones, and February, March, and April for the cangrejos. After the breeding season, these forms enter deeper water and are more difficult to capture.

Stocking Recommendations.—The guapote is furnishing a considerable quantity of food, but the lake would produce more food if it contained fishes that utilize additional habitats, particularly deeper water. For increasing the food production, we suggest the introduction of the crappie (Pomoxis nigro-maculatus) and the channel catfish (Ictalurus lacustris punctatus). In order to prevent an over-abundance of the above forms, and to provide sport fishing, the smallmouth (Micropterus dolomieu) and largemouth (M. salmoides) bass are recommended. It is essential to have the largemouth bass present as a predator, to reduce the numbers and permit more rapid growth of the crappie and mojarras. Although the lake appears well suited for smallmouth bass, this species has not proved as satisfactory as the largemouth bass in regulating populations. A combination of both the basses makes for improved sport fishing, as there are times when one species will take a hook and the other will not. These recommendations are tentative and provisional.

Lago de Atitlán

Lago Atitlán is a mountain lake about five kilometers south of Solola, at an altitude of 1,554 meters. It is about twenty kilometers long and seven wide. Two arms, one at each end, extending southward. The total area is more than 200 square kilometers. The lake is surrounded by mountains which rise directly from the water's edge to an elevation of about 760 meters above its surface. To the south, the summits of the volcanoes Toliman and Atitlan reach altitudes of 3,153 and 3,525 meters, respectively; and to the southwest, the volcanoes San Pedro and Santa Clara reach 3,024 and 2,127 meters. Lake Atitlan has no surface drainage to the sea. A number of small streams enter the lake.

At the west and east ends, the lake bottom descends rapidly to depths of 100 meters or more within 130 meters of the shore. Along the south shore between San Lucas and Santiago Atitlan, the bottom slopes are less steep, and there are several small coves. In the coves and along much of the shore in shallow water are tules (Typha and Scirpus). Potamogeton and Chara are abundant in the coves and along much of the rock shore lines out to depths of six or seven meters. The north shore from Santa Cruz to Santa Catalina consists largely of wave-swept sandy and gravelly beaches. The littoral areas between one and one-half and seven meters are covered with Potamogeton and Chara. Much of the lake bottom is more than 300 meters in depth, and rather flat. The greatest depth found was approximately 320 meters.

Chemical Data.—Oxygen samples taken at various depths and recorded in parts per million were as follows: May 8, 1946, 8:00 to 10:00 a.m., 1 meter - 4.9; 10 meters - 6.6; 20 meters - 6.1; 40 meters - 6.1; 60 meters - 5.6; 80 meters - 5.3; 100 meters - 5.0. May 9, 1946, 8:00 to 10:00 a.m., 120 meters - 4.3; 150 meters - 4.7; 190 meters - 5.0; 230 meters - 4.1; 270 meters - 3.2; 320 meters (bottom) - 3.9. May 15, 1947, 8:30 to 9:30 a.m., 1 meter - 7.0; 30 meters - 8.3; 60 meters - 3.6; 90 meters - 5.1; 213 meters - 2.2.

A sample taken at 8:00 a.m., May 8, 1946, at a depth of one meter showed 1.5 parts per million of carbon dioxide. Samples taken at 270 meters and 320 meters at 10:00 a.m., May 9, 1946, contained 1.7 and 1.0 part per million, respectively of carbon dioxide.

Temperatures in Centigrade taken at 8:00 a.m., May 8, 1946, were as follows: Air - 20 degrees; water at 1 meter - 23.33 degrees; and at 320 meters (bottom) - 21.67 degrees. Temperatures taken at 9:30 a.m., May 15, 1947, were as follows: Air - 21 degrees; water at 1 meter - 23.33 degrees; and at 312 meters - 20 degrees. Meek (1908) reported 20 degrees as the water temperature from surface to 750 feet (229 meters). Juday (1915) recorded water temperatures on February 12, 1910, as follows: surface, 19.6 degrees; at 5 meters, 19.6 degrees; and at 50 and 315 meters, 19.2 degrees.

Meek (1908) found three species of fishes in the lake. These were serica (Cichlasoma nigrofasciatum), pescadito (Mollienisia sphenops), and gulumina (Profundulus guatemalensis). In recent years, other fishes have been introduced as follows: the pepesca (Astyanax), the pupo (Poecilistes), and three species of mojarras (Cichlasoma). Neither the larger mojarras nor the pepesca are utilized extensively as food, because they are difficult to catch by hook and line. The remaining species are small, usually reaching lengths of less than 10 centimeters. These are trapped in the shallow water areas, dried, and utilized in soups. The crab or cangrejo (Potamocarcinus guatemalensis) occurs abundantly during the breeding season with extends through February, March, and April, and is common throughout the year. It appears to be utilized for food more than the fishes. The shrimp or camaron (Palaemon carcinus) has not been recorded from the lake, although it occurs in most streams and lakes in the Republic.

Although Lake Atitlán is large, having approximately 250 kilometers of shore line, dried fish are brought from the coastal areas to supplement the fish caught in the lake. There is no foreseeable reason why a fish supply adequate for local food requirements cannot be produced in the lake. Moreover, since the lake has become a popular resort because of its delightful climate and beautiful scenery, it is important that sport fishing be developed as an additional attraction.

To develop the food and sport fishing, the introduction of crappie (Pomoxis nigromaculatus) and smallmouth bass (Micropterus dolomieu) is recommended. The introduction of largemouth bass is not recommended, for the lake appears better suited to the smallmouth bass, a superb sport fish. Later, it may become desirable to introduce the largemouth bass (M. Salmoides) in order to prevent the crappie from becoming too numerous.

Lago de Ayarza

Lago Ayarza, an area of about 2800 hectares, is approximately seven kilometers southeast of San Rafael la Flores, from which it may be reached easily with pack animals. The lake lies in an old volcanic crater at an altitude of 1,450 meters, and the rim of the surrounding mountain is about 500 meters above the lake surface on the average. The lake is approximately seven kilometers long and four wide. The greatest depth found was 229 meters, at a point near the middle of the west end. No soundings were made in the eastern end of the lake. The lake bottom descends to depths of 10 meters or more within a distance of 5 to 10 meters from shore. The marginal vegetation is usually not more than one or two meters in width, and consists of Potamogeton for the most part.

The dissolved oxygen was 7.5 parts per million at 1 meter, 7.0 at 35 meters, 0.7 at 120 meters, 0.16 at 171 meters, and 0.43 at 223 meters. These tests were made at 6:00 p.m., May 10, 1947, with the surface water at 23 degrees Centigrade and bottom water (229 meters) at 22 degrees. The methyl orange alkalinity was 125 parts per million. The Secchi disk (20 centimeters in diameter) disappeared at 10.6 meters.

The lake is considered to be less productive of fish foods than any of the larger lakes observed in Guatemala. It supports a large population of cangrejos or crabs (Potamocarcinus guatemalensis), and Amphipoda are abundant in the shore areas. The gulmina (Profundulus) was the only fish collected in the lake. Although fish production cannot be expected to be as heavy as in most of the other lakes, there is no apparent reason why more than sufficient fishery foods cannot be produced for the people living in the vicinity of the lake as well as good sport fishing for those visitors who come to enjoy the scenery and play.

To develop the resources of the lake, the introduction of the chumbimba (Cichlasoma maculicauda) from Lago Izabal, and the guapote (Cichlasoma motaguense) from Laguna de Amatitlán are recommended. About two to three years or longer after these introductions, the smallmouth bass (Micropterus dolomieu) should be introduced, provided that this species is successful and desirable in Lago Atitlán. Its predacious feeding habits would be important in preventing the mojarras from becoming too numerous. With the introduction of bass into Lago Ayarza, the number of cangrejos (crabs) probably will be reduced. However, on the basis of observations in some of the Pacific coastal lagoons, where anadromous fishes with predatory feeding habits occur, it is believed that the cangrejos will continue to provide as much meat as is now being taken in this form. The addition of fishes to the fauna will increase the usable aquatic resources many times, as the cangrejo is the only form taken for food at the present time.

Laguna de Atescatempa

Laguna de Atescatempa is located along the Pan-American Highway about two kilometers west of the international boundary of Guatemala and El Salvador, at an altitude of 854 meters. It has no visible outlet.

When examined March 14, 1946, the lake covered an area of about 280 hectares. A year later on April 14, the lake was only about one-half as large, and the water level was about one meter lower. Usually the water level fluctuates about one meter between the dry and rainy seasons. The presence of dead camalote bushes (Acacia-like plants) at a depth of one meter indicated that the water level had been much lower for a period of years prior to 1946. The local people claim that they have known the lake to become so low that only two small water areas remained. For a period of many years prior to 1947, the lake apparently had remained at a rather constant level, with only the normal seasonal fluctuations.

On March 14, 1946, at 11:00 a.m., the air was 27.4 degrees Centigrade; the surface water, 28.3 degrees; at one meter in depth, 27.2 degrees; and at four meters (bottom), 23.3 degrees; phenolphthalein alkalinity, none; and methyl orange alkalinity, 119 parts per million.

On April 15, 1947, at 8:30 a.m., the air was 27.7 degrees Centigrade; the surface and bottom waters (at four meters), 27.2 degrees; phenolphthalein alkalinity, 37.5 parts per million; and methyl orange alkalinity, 40.5. Oxygen samples taken at 11:00 a.m., March 14, 1946, showed 5.4 parts per million at one meter, 4.2 at three meters, and 2.2 at four meters. No significant differences appeared in the 1947 tests. Unfortunately, no tests were made prior to sunrise for comparison with those later in the morning. Since the lake had an extremely heavy population of unicellular algae, tests before and after sunrise might have confirmed the assumption that rapid changes in carbon dioxide and oxygen levels were the cause of the fish mortality there on April 3, 1947. Since most of the loss occurred among the larger fish, it is believed that the weakened condition of spawning fish increased the mortality.

The fish fauna of the lake consisted of pepesca (Astyanax), plateado or sardina (Roeboides), bute (Mollienisia and Poecilistes), serica (Cichlasoma nigrofasciatum), anguila (Synbranchus), mojarra (C. trimaculatum), and one unidentified species of mojarra with black and white bands. Seven individuals of C. trimaculatum ranged from 103 to 221 millimeters in total length, and averaged 152. Forty-seven of the black and white banded mojarras ranged from 140 to 280 millimeters in total length, with an average of 206. These fish represented the total catch from two hours fishing with two cast nets. The principal method of fishing here is with cast nets or attarrays, as these species of mojarras do not readily take a hook. The quantity of fish taken in gill nets and in seines suggested rather poor utilization of the fishery resources in the lake. It is believed that the fishery resources would be used more fully if efficient fishing gear were permitted. For adequate utilization, it is believed that cast nets and hook-and-line fishing should be permitted throughout the year.

For further development of the fishery resources, it may prove desirable later to introduce the black crappie (Pomoxis nigro-maculatus), the channel catfish (Ictalurus lacustris punctatus), and the largemouth bass (Micropterus salmoides).

Lago Calderas

Lago Calderas is located about 10 kilometers south of Laguna de Amatitlan, at an altitude of 1,780 meters. It covers about 24 hectares and is oval in outline. It was examined March 10, 1946; at 1:00 p.m., the air was 21 degrees Centigrade and the water 22 degrees; phenolphthalein alkalinity was 19 parts per million, and methyl orange alkalinity, 126. Boats were not available to make soundings, but local residents informed us that the lake is about 46 meters in depth.

The pepesca (Astyanax), pescadito (Poecilistes), and the pupos (Mollienesia and Profundulus) were taken in the seine hauls. One mojarra is said to be present also. All the fishes were reported to have been introduced from Laguna Amatitlan.

A narrow margin of aquatic vegetation is present around most of the lake shore. Genera of plants represented are Brasenia, Typha, Scirpus, Potamogeton, Chara, Myriophyllum, and Eichhornia.

In the event that a decision is reached for planting exotic species, the black crappie (Pomoxis nigro-maculatus) and the largemouth bass (Micropterus salmoides) are recommended, for it is believed that these species would provide more food than any other. The guapote (Cichlasoma motaguense) would be desirable as a food fish and to supply forage for the bass and crappie.

Laguna de Pino

Laguna de Pino, with an area of about 20 hectares, is located along the Pan-American Highway 45 kilometers southeast of Guatemala City, at an altitude of 1,040 meters. It is shaped somewhat like a frying pan, with the handle representing the upper basin, and the pan the lower basin. The upper basin is shallow, reaching depths of one and one-fifth meters. The bottom of the lower basin descends sharply at the outer margin of the tules (Typha and Scirpus) to two meters, and then more gradually to depths of three and three-fifths meters. It is estimated that half of the lake is less than two meters in depth. The continuous marginal bed of tules occupies a strip averaging about three meters in width. Potamogeton occurs in limited amounts in the shallow areas of the small coves.

At 3:00 p.m., March 31, 1946, the air was 30 degrees Centigrade; and the surface and bottom waters, 28 degrees. On April 5, 1947, at 2:30 p.m., the air was 27 degrees; the surface and bottom waters, 26 degrees. The alkalinity on March 31, 1946, was as follows: phenolphthalein, 31; methyl orange, 200 parts per million. Throughout the dry season, the lake is turbid with a heavy growth of microscopic plants and animals. The Secchi disk (20 centimeters in diameter) disappeared at one and one-half meters.

The lake contains numerous small fishes of the families Characinidae, Cyprinodontidae, Poeciliidae, and one mojarra, Cichlasoma guttulatum. The mojarra reaches 275 millimeters in length, but it is not utilized to a great extent. The fishermen report that it will not take a hook readily. The lake is extremely rich in fish foods, and should furnish an abundance of food and game fishes if more desirable species are introduced.

For the development of the fishery resource in this lake, the introduction of the following species is recommended: black crappie (Pomoxis nigro-maculatus), channel catfish (Ictalurus lacustris punctatus), guapote (Cichlasoma motaguense), and the largemouth bass (Micropterus salmoides).

Lago Lemoa

Lago Lemoa is located in San Sebastian Lemoa, 12 kilometers southwest of Santa Cruz Quiché. It has an area of about 12 hectares, and lies at an altitude of approximately 2,000 meters. The depth may be reduced as much as three to four meters, and the area about 17 per cent, due to evaporation during the dry season. The lake does not have an outlet, but the surrounding area drains into the Rio Negro, and is a part of the Usumacinta drainage. A heavy growth of phytoplankton permitted one to see objects down to a depth of about 38 centimeters. Marginal beds of Potamogeton, Chara, and grasses (Gramineae), three to

five meters wide, grow in water less than approximately two meters in depth. The bottom near shore consists of mud and silt, with small quantities of gravel and sand.

The lake was examined April 1, 1947. At 8:00 a.m., the air was 23 degrees Centigrade; the surface water, 22 degrees. Tests showed no phenolphthalein alkalinity, and 21 parts per million of methyl orange alkalinity. Depths were not determined, as a boat was available. Seine collections indicated an abundance of pupos (Mollienisia and Profundulus). A few small carp (Cyprinus carpio) also occurred in the seine hauls. They were not abundant, and few large carp are caught by hook-and-line fishing, according to information obtained locally.

In order to provide food fishes, it may prove desirable to introduce the crappie (Pomoxis nigro-maculatus), largemouth bass (Micropterus salmoides), and the guapote (Cichlasoma motaguense). The smallmouth bass (Micropterus dolomieu) is not recommended, because of the small size and swampy character of the lake, and the lack of satisfactory gravel bottoms for spawning purposes.

Lago Moca

This artificial lake covers about three hectares, and is located on the Finca Moca, east of Mazatenango, at an altitude of approximately 915 meters. The lake is in an area of heavy rainfall on the Pacific slope south of Lake Atitlán, and is supplied with water through a control gate from the Moca River. The lake becomes murky with silt at times during the rainy season; but apparently this does not markedly affect the heavy growth of phytoplankton, which is present throughout the year. Growths of Potamogeton, and to a lesser extent Nymphaea, occur in the shallow areas.

Lago Moca was examined at 2:00 p.m., March 22, 1947. The air temperature was 20 degrees Centigrade; the surface and bottom waters at six meters were 23.3. The phenolphthalein alkalinity was 12.5 parts per million; methyl orange alkalinity, 67.0. From the several soundings made, it is believed that approximately six meters is the maximum depth. The following fishes were taken by seining: pepesca (Astyanax), pescadito (Poecilistes), gulumina (Profundulus), and a mojarra (Cichlasoma). The latter species was established in the lake by the introduction of five individuals carried there from a nearby lowland stream in 1914. It is abundant, but is little utilized because of its aversion to taking a hook.

For the development of sport fishing, smallmouth bass (Micropterus dolomeiu) would be a desirable species. If additional food fishes are required, the crappie (Pomoxis nigro-maculatus) could be introduced. In that event, it would be advisable to plant the largemouth bass (Micropterus salmoides) in order to prevent the crappie from becoming too abundant to obtain normal growth and size. In lakes of this character, it is not likely that the smallmouth bass would prevent the crappie from becoming too abundant.

Lago San Cristobal

This lake has an area of about 150 hectares, and is located at the edge of the town of San Cristobal, southwest of Coban, at an altitude of approximately 1,300 meters. Little fluctuation in water level occurs seasonally. The swampy shore line has a margin of tules (Typha and Scirpus) averaging about four meters in width. The tules are present to depths of about two meters. Potamogeton and Chara usually occur in parts of the lake which are less than three meters deep. The lake bottom consists of mud, which in most areas near the shore is one or more meters in depth. In the middle of the lake, the mud is only a few centimeters in depth.

At 9:30 a.m., May 7, 1947, the air was 24 degrees Centigrade; the surface water, 19 degrees; and at 18 meters (bottom), 20 degrees. The phenolphthalein alkalinity was 8 parts per million; and the methyl orange alkalinity, 148. Oxygen samples showed 5.5 parts per million at 1 meter, 5.2 at 5 meters, and 4.6 at 18 meters. The carbon dioxide samples showed a trace at 1 meter, 26.5 parts per million at 10 meters, and 29 at 18 meters. The Secchi disk (20 centimeters in diameter) disappeared at 165 centimeters. The turbidity resulted from the large numbers of phytoplankton organisms.

The following fishes were collected with seines and gill nets; the pepesca (Astyanax), the mojarra (Cichlasoma irregulars), and the carpas (Cyprinus carpio and Carassius auratus). The latter two species were not numerous.

Development of the fishery resources could be advanced by the introduction of the following species: the crappie (Pomoxis nigro-maculatus), the guapote (Cichlasoma motaguense), and the largemouth bass (Micropterus salmoides).

Lago Ixpaco

This lake, about four hectares in area, was examined April 21, 1946. It is about ten kilometers north of the town of Chiquimulilla. The water has a high sulphur content, and contains no fish. Because of the high sulphur content, stocking would not be justified.

Laguna de Escondida

This small lake on the side of Tecuamburro volcano, was not examined. It was reported to be similar to Lago Ixpaco in having a high sulphur content.

Small Lake Near Huehuetenango

On May 12, 1946, while driving from Huehuetenango to Aguacatan, we passed a pond about one hectare in area, located five kilometers north of Huehuetenango. Only the small gulumina (Profundulus) was taken by seining. The site presents an excellent opportunity for the construction of an artificial lake of 25 to 40 hectares or more for the recreational use of the people of the city of Huehuetenango. Study of the site by an engineer would be necessary to determine the costs of development and the amount of water area that could be impounded. It is believed that fishing in the existing pond could best be developed by stocking with the largemouth bass (Micropterus salmoides) and the guapote (Cichlasoma motaguense).

Lago Izabal, El Golfete, and Río Dulce

Lago Izabal is located about 35 kilometers southwest of Livingston. It can be reached by boat from Panzós by way of the Río Polochic, or from Livingston by way of the Río Dulce and El Golfete. The lake is about 47 kilometers in length, and 20 in greatest width. Its area is approximately 67,500 hectares, and elevation about 10 meters above sea level. The lake is oblong in outline with a relatively flat bottom that descends at the deepest point to 16 meters (Map No. 2). All of the upper end of the lake has a bottom of alluvial detritus deposited from the Río Polochic. Marginal vegetation covers about two-thirds of the upper shore line. It averages about five meters in width and consists of Chara, Potamogeton, Scirpus, Typha, Utricularia, and two or more species of Graminea. The south shore has wave-swept, hard, gravelly beaches for the most part, with little aquatic vegetation. The north shore is irregular. There are numerous coves, the bottoms of which consist largely of mud. About four-fifths of the north shore line possesses a margin of aquatic vegetation averaging four meters in width, and consisting principally of tules (Typha and Scirpus).

The lake usually is subjected to strong wind action every afternoon. The wind may start blowing suddenly anytime between 1:00 p.m. and 3:00 p.m., and continue until 6:00 p.m. Sometimes the waves become too high for the safety of boats of 7 to 10 tons capacity.

Water samples taken from the lower end of the lake between 1:30 p.m. and 2:30 p.m., April 5, 1946, contained 7.1 parts per million of oxygen at 1 meter, 7.3 at 5 meters, 5.0 at 10 meters, and 5.2 at 12 meters (bottom). On April 7, 1946, water samples taken in the middle of the lake between 9:00 a.m. and 10:00 a.m., contained 5.4 parts per million of oxygen at 1 meter, 7.3 at 5 meters, 5.8 at 10 meters, and 5.2 at 12 and 15 meters. At 7:00 p.m., April 26, 1947, water samples taken in the lower end of the lake contained 6.9 parts per million of oxygen at 1 meter, 4.6 at 5 meters, and 6.6 at 10 meters (bottom); samples taken at the same time contained 2.0 parts per million of carbon dioxide at 1 meter, 8.0 at 5 meters, and 11.2 at 10 meters.

Alkalinity tests made at the upper and lower ends of the lake at the time the other samples were taken showed no phenolphthalein alkalinity, or only a trace; and the methyl orange ranged from 76 to 100 parts per million, with the smaller amount at the upper end of the lake.

In 1946, the surface and bottom water temperatures were 29 degrees Centigrade; and in 1947, 29.5 degrees. Air temperatures at the time of the tests were from 29 to 30 degrees.

A Secchi disk (20 centimeters in diameter) disappeared at 2.86 meters at 1:30 p.m., April 5, 1946, and at 1.8 meters at 10:00 a.m., April 26, 1947. Both readings were made in the lower end of the lake. The lower transparency in 1947 was due, apparently, to increased phytoplankton.

Approximately 37 genera and 50 species of fishes were collected from Lago Izabal. It is probable that many of the species are new, for no extensive collection of fishes had been made there prior to this study. A list of the genera of fishes collected in Lago Izabal is as follows:

Carcharhinus: Pristis; Tarpon; Anchoa; Anchovia; Hyphessobrycon; Astyanax; Brycon; Caleichthys; Arius; Bagre; Rhamdia; Strongylura; Hyporhamphus; Belonesox; Gambusia; Mollienisia; Phallichythys; Centropomus; Thyrinops; Mugil; Eucinostomus; Eugerres; Oligoplites; Caranx; Micropogon; Archosargus; Cichlasoma; Herichthys; Oostethus; Pseudophallus; Coliomorus; Lophogobius; Gobioides; Garmannia; Synbranchus and Trinectes.

El Golfete lies about 10 kilometers below Lago Izabal. The two lakes are connected by a channel which is from one to two kilometers wide, and four to eleven meters deep. At San Felipe, the outlet of Lago Izabal, the channel is only about 50 meters wide. El Golfete is approximately 15 kilometers long, three to five wide, and has a total area of about 6,000 hectares. It is surrounded by dense jungle, and the water extends into mangrove swamps. For the most part, the water is from four to five meters deep, and the bottom consists of soft mud (Map No. 1).

At 10:30 a.m., April 11, 1946, water samples showed 4.8 parts per million of oxygen at 1 meter, and 5.0 at 5 meters (bottom). The carbon dioxide content was 2 parts per million at 1 meter, and 7 and 5 meters (bottom). Surface and bottom water temperatures (5 meters) were 29 degrees Centrigrade. Methyl orange alkalinity was 35 parts per million. The Secchi disk (20 centimeters in diameter) disappeared at 1.8 meters. No fish collections were made in El Golfete.

Río Dulce drains El Golfete, and flows into the Bahia de Amatique at Livingston, a distance of about 13 kilometers. The gradient from El Golfete to the mouth of the Rio Dulce is about 0.7 meters per kilometer, a total of less than 10 meters. The depth varies from 3 to 40 meters and the width from 15 to 45 meters. During the dry season, the current is imperceptible to the eye. Strong winds usually blow upstream in the afternoons, and may carry salt water to the lower end of El Golfete. The water of Rio Dulce may vary from fresh to brackish according to the strength of the winds and seasonal rains which affect the volume.

The stream has many right angle turns, and has cut deep into limestone formations, forming cliffs 15 to 75 meters or more in height. The white cliffs are covered in most places with tropical vegetation, and many of the walls are cavernous. The boat journey from Livingston to El Golfete is extremely scenic and delightful. The stream is also popular for its sabalo (Tarpon) and robalo (Centropomus) fishing.

The Río Dulce, El Golfete, and Río Polochic areas contribute to the economy of Guatemala principally as a waterway over which commodities transported between the railroad terminus at Panzós and Livingston and Puerto Barrios. Any recommendations for the development of the fisheries should consider primarily the economic improvements that may be made locally or for the entire Republic. At the present time these waters are utilized little for commercial fishing. Only one small commercial seine was found on the lake. Although fishing there probably can be profitable, it would appear that considerably more profits can be made in salt water at Livingston and the surrounding areas. From 10 hauls made at random with a seine 183 meters in length and 4.8 meters in height, approximately 186 kilograms of fish were taken from Lake Izabal. This is an average of 18.3 kilograms per haul. Other hauls made in areas chosen by experienced fishermen netted from 27 to 73 kilograms per seine haul. These catches consisted of many inferior food fishes such as the catfishes (bagre), mojarras (Cichlasoma), machaca (Brycon), and sabalo (Tarpon), as well as the more desirable robalo (Centropomus). Except in January when robalos are numerous in Lago Izabal

they are usually small and sell at inferior prices on the Guatemala City market. The commercial fishermen at Livingston occasionally fish the waters at El Golfete and Lago Izabal during seasons of the year when fishing is unprofitable in the Bahia de Amatique. However, the fishermen usually prefer to use these periods to repair boats and fishing gear.

Three of the five species of bagre (catfish) found in the lake occur in such numbers that they could be profitably placed on the market as dried fish.

It is possible that commercial fishing could be improved in the Lago Izabal -- El Golfete area by introducing the crappie (Pomoxis nigro-maculatus). Since there is an abundance of excellent habitat for this species, its introduction might be of great value in providing a dependable year-round source of food fish. The abundance of small fishes in Lago Izabal does not indicate that the introduction of additional predatory species would cause a lack of adequate forage species.

The lake has an abundance of Crustacea, including cangrejos or crabs (Potamocarcimus guatemalensis), camerones or shrimp (Palaemon), Amphipoda or "pulgas", and a small crustacean belonging to the family Palaemonidae.

By using baited wire hoop nets or traps for taking bagre (catfish), and by capitalizing on the robalo runs, commercial fishing could be profitable for small operators with inexpensive equipment. To encourage this type of fishing, it would be desirable for someone with sufficient capital to furnish the wire meeting, train the natives to use the equipment and dry the fish properly. Periodically the dried fish could be collected and transported to inland cities. With the type of labor available at such points as San Felipe and El Estor, it is believed that this system could be developed into a small but profitable enterprise.

It is believed that the development of good sport fishing in the Río Dulce - El Golfete - Lago Izabal waters would contribute more to the economy of the area than good commercial fishing. There appears to be no reason, however, why the two could not be developed simultaneously. These waters probably present what is some of the best sabalo (Tarpon) fishing to be found anywhere. In the first half of January, the robalo runs also provide superb sport fishing, according to reports. In addition to these species, mojarras are common if not numerous. The big difficulty with present sport fishing is the lack of excellent sport fishes that can be taken readily throughout the year. Although the tarpon is common, it is unusual to take more than two or three on a day's trip. The mojarras are not readily taken by hook-and-line fishing, nor do they create much interest as a sport fish. The establishment of a population of black bass (Micropterus salmoides) in these waters should do much to stimulate interest in the utilization of both sport and food fishes. The waters appear exceptionally well suited to the largemouth bass. The presence of crappie for commercial fishing should improve hook-and-line fishing materially.

With the development of sport fishing, the area should become popular enough with tourists to make the operation of hotels profitable either in the vicinity of San Felipe or Livingston. With adequate hotel accommodations and boats, this water area should become a real economic asset to the Republic through accommodations for tourists and fishermen, boat rental, guide service, and the sale of related accessories. Excellent salt-water fishing is available near Livingston and Puerto Barrios. The journey from Puerto Barrios to Panzós by way of Livingston, Río Dulce, El Golfete, Lago Izabal, and Río Polochic has already become popular as a scenic trip for tourists. The equable climate, with good fishing, and appropriate hotel accommodations may well make the area one of the more popular resorts of the Western Hemisphere. However, definite action on the introduction of largemouth bass and crappie should await determination of the success of trial plants of these species elsewhere in Guatemala.

Pacific Coastal Lagoons

The Pacific Coast of Guatemala is approximately 320 kilometers in length. Along the coast and inland to distances of 10 kilometers, more or less, are innumerable brackish and freshwater lagoons ranging in size from a few to several hundred hectares in size. Many of these water areas are linear in form and lie parallel to the coast. There are also a

number of old river channel lagoons lying more or less perpendicular to the coast, and a number of irregular-shaped water areas. Except for those maintained by tidal action, the lagoons are subject to large seasonal changes in size, and many are dewatered during the dry season. In the rainy season, the salinity of many brackish waters is decreased, and some may become entirely fresh. This change in salinity increases the areas available for fresh-water fishes and decreases the areas for salt-water forms. The reverse is true during the dry season. A reconnaissance flight paralleling the coast at a distance of about four kilometers inland and returning along the coast was made on May 19, 1947. At that time, there were 12 to 15 lagoons and rivers open to the sea over shallow bars. Perhaps twice that number are open during the rainy season.

It was estimated that 140,000 hectares or more of bays, lagoons, and natural canals existed on May 19. For the most part, access by roads is difficult during both the dry and the rainy seasons. In the near future it will be possible to reach San Jose by paved road from Guatemala City. From San Jose eastward to El Salvador, most of the coastal water areas can be reached by small boats by way of the Chiquimulilla Canal. Roads permit access to the canal at Iztapa and Ahumado, at least during the dry season. Between San José and México, roads reach the coast at Sipacate, south of Tiquisate, at Champerico and at Ocós. Many of the lagoons in other areas can be reached by truck if one is acquainted with local roads.

Observations were made near Ahumado, in the Chiquimulilla Canal from San José to Iztapa, 40 kilometers south of Tiquisate, at Champerico, and at Ocos as roads, boats, and motors permitted.

Salina de Acapan, lying about six kilometers west of Champerico, was examined March 27, 1947. It was approximately 16 kilometers long, from one-fourth to one kilometer wide, and generally from about 30 to 120 centimeters deep. The bar at its mouth had been closed for some time prior to our visit. The water at the village of Acapan had a salinity of 11 per cent. A six-hour night set with 550 feet (167.6 meters) of gill-nets and 100 feet (30.4 meters) of tammel netting resulted in a catch of 42 kilograms of fish. It is believed that catches of 50 to 150 kilograms could have been taken in single hauls with a large seine of 150 meters length. Sixteen genera of salt-water and anadromous fishes were represented in the catches. All could have been sold in the inland cities. However, of the total weight taken, only about 10 kilograms were of quality species such as the robalo (Centropomus) and pargos or snappers (Lutjanus), which bring premium prices on the market in Guatemala City.

Seining in the bay at Iztapa with experienced fishermen assisting in the work did not indicate that this method would be productive enough to warrant its use where tidal currents carry brush and other objects that interfere with seining. The use of hoopnets with wings and leaders resulted in catches of 5 to 10 kilograms of bagre (Arius and Galeichthys) per trap for each change in tidal action.

Near Ocós, an overnight set with 450 feet (137 meters) of gill-nets in brackish waters affected by tidal action resulted in a catch of approximately 80 kilograms of fish, but only two (Centropomus and Lutjanus) of nine genera of the fish taken could be classified as quality fish.

Observations at the points visited indicate that most of the commercial fishing is done on a small scale by individuals with one or two helpers, and the fish are either salted and dried or sold fresh in the nearby village. Fish caught at San José and Iztapa are sent to Guatemala City in small amounts, and fish from other points reach inland cities in limited quantities. Just prior to and during Lent or Holy Week, the demand for fish is large, and prices are high. Consequently, during this period, fishing effort is high and considerable quantities of fish reach inland cities.

Owing to the lack of refrigeration in most towns, and the high cost of ice, fishing gear, and transportation to inland cities, the poor quality of labor available, and the lack of large quantities of high quality fishes such as robalo (Centropomus) and pargos (Lutjanus), fishing effort in the canals, bays, and lagoons is not great. However, with high prices, many of the brackish water lagoons and bays offer commercial possibilities for those with small boats and moderate investments in fishing gear. The logical market for

such catches would be in nearby inland towns where only a few hundred pounds of fresh fish are needed weekly. In conjunction with the sale of fresh fish it would be expedient to salt and dry species such as the bagre (catfish) in order to hold them for the higher prices of Holy Week.

Sport fishing in the brackish and fresh waters of the coastal area is not considered to be good. The robalo (Centropomus) is regarded as the only game fish in the fresh waters. Other species, principally the mojarras, are taken by hook-and-line fishing, but neither of these two groups of fishes take a hook well. The introduction of the largemouth bass (Micropterus salmoides) should add much to the sport fishing in the streams and lakes of this area. For a good quality food fish that will take a hook readily and add to the quantity and quality of commercial fishing in the fresh water lagoons, the crappie (Pomoxis nigro-maculatus) is indicated. It is believed that they would become acclimated to slightly brackish conditions as they have in certain waters in the United States. The abundance of food for these species in the fresh waters of the Pacific coastal lagoons should permit their development in large numbers. Definite recommendations for their introduction are withheld pending successful establishment in other waters.

Lakes and Streams of Petén

The Department of Petén has several large lakes and many miles of large rivers. This Department was not visited, but some data are available from the publication "Mollusca of Peten and North Alta Vera Paz, Guatemala," by Goodrich and van der Schalie (1937). The data are summarized here in order that they may be more available if desired.

That Lake Petén varies considerably in water level is indicated by the "drowned" trees standing in three meters of water in 1935, and the presence of shells, identical to present forms, 9 to 12 meters above the 1935 water level. The lake has a steep north shore, and a gentle sloping south shore. The maximum depth in 1935 was 45 meters. The dissolved oxygen in the surface waters was 13.73 parts per million at a temperature of 25 degrees Centrigrade. The methyl orange alkalinity was 80 to 90 parts per million.

Laguna de Eckixil had a methyl orange alkalinity of 110 parts per million, and 8 parts per million of dissolved oxygen at 27 degrees Centigrade.

Laguna Perdida had a methyl orange alkalinity of 93 parts per million.

Río San Pedro at El Paso de los Caballos was deep, sluggish, and lake-like. Its methyl orange alkalinity was 215 parts per million.

Río de la Pasion had a methyl orange alkalinity of 163 parts per million.

The present writer had an opportunity to cross Peten three times by plane when observations could be made. Plans to make studies of the waters in this area did not materialize because of the impossibility of obtaining plane passage at the times required to fit our work schedule.

The Department of Petén is underlaid with limestone, and there are many aguadas or limestone sinks. The limestone outcrops are probably of Cretaceous age. Local areas of savannah and large areas of tropical forest exist.

No recommendations for developing the fishing resources of Peten are made at this time. It is believed advisable to wait until a thorough study can be made of each major drainage.

Summary of Stocking Recommendations

Three species of fishes native to waters of the United States are recommended for introduction into Guatemalan waters on a trial basis. These trial introductions involve the smallmouth bass (Micropterus dolomieu) and the black crappie (Pomoxis nigro-maculatus) for Lago Atitlán, and the channel catfish (Ictalurus lacustris punctatus) for the Rio Motagua.

The immediate transfer of about 100 or more of the guapote (Cichlasoma motaguense) from Laguna Amatitlán to Lago Ayarza is recommended. This will increase the food resources for the people living in that area, and prepare this lake for the introduction of smallmouth bass if desired in later years.

If the introduction if the fishes native to the United States is successful in a manner that warrants planting them into other waters, the outline of recommendations made for each lake and stream can be followed. These recommendations involve the introduction of the guapote (C. motaguense), the chumbimba (C. maculicauda) and the largemouth bass (Micropterus salmoides). If the trial introductions prove successful, the planting in other waters can be done most economically through the operation of a fish hatchery. The operation of a fish hatchery, however, is recommended only if trained personnel are available for operating the hatchery and seeing that the correct species of fish are planted in the respective waters.

The waters for which recommendations are made include over 210,000 hectares of lakes and lagoons, and approximately 4,000 kilometers of streams. These recommendations do not include the streams of the Cuchumatanes, Lago Yoinajab and other nearby lakes in the Department of Huehuetonango, nor the waters in the Department of Petén, where several large and many small lakes as well as many kilometers of large streams occur.

The priority of stocking should be established at the beginning of the development program, if and when the trial introductions have proved successful. Priority should be given to those waters where the most value can be expected. It is believed that initial development should be in the interior waters, where intensive use is expected. These waters would include Lagos Amatitlán, Atitlán, Pino, San Cristobal, Lemoa, Atescatempa, Ayarza, and other highland lakes. The second priority probably would be the Río Motagua and the streams of the Pacific Coastal Plain and Piedmont. The priority of Lago Izabal and El Golfete would be dependent upon the development of facilities for tourists and sport fishermen and the need for commercial fishes.

Trout are not recommended for introduction because of the limited suitable waters observed, the excessive cost of developing and maintaining trout fishing, and the need for more study and exploration of waters, particularly in Cuchmumatanes.

The stocking rates for most waters cannot be stated precisely, but some general suggestions can be made to permit a degree of uniformity and ample stocking, and to prevent the wasting of fish. Lakes should be stocked at a specified rate per kilometer of shore line, according to type and quality of habitat present.

Smallmouth bass should be planted in the highland lakes recommended for them at the rate of approximately 100 per kilometer of shore line; and in streams at the rate of from 50 to 100 per kilometer, according to width. The total number for a stream should be calculated from the approximate total length of the stream suitable for smallmouth bass.

Largemouth bass should be planted in the highland lakes recommended for them at the rate of 200 per kilometer of shore line; and in streams at the rate of 50 to 100 per kilometer, according to width. The total number needed for a stream should be calculated from the approximate total length of the stream suitable for the species. The large lowland lakes and lagoons should be planted at the rate of 400 per kilometer of shore line. The small lagoons should be stocked at the same rate as the highland lakes.

Crappie and channel catfish should be planted at the same rate as largemouth bass, except in Lago Atitlan, where crappie should be planted at the same rate as smallmouth bass.

The guapote and chumbimba should be planted in the lakes recommended at twice the rate for largemouth bass, or 400 per kilometer of shore line.

It is believed that all waters should be stocked at the above rates for two successive years. Additional stocking may be needed. This can be determined by seining along the shorelines to determine if the introduced fishes have reproduced. After repro-

duction occurs, it should not be necessary to do further planting unless it should be found desirable to introduce additional species.

The difference in rate of stocking of different species is reflected in the potential productivity of the waters involved and the types and numbers of fishes already present. Smallmouth bass waters like Lagos Atitlán and Ayarza are less productive than most other highland lakes where largemouth bass are recommended. In the large lowland lagoons (100 hectares or more), less survival is expected because of the presence of anadromous predatory fishes. The lowland lagoons are more shallow, and have larger proportions of the total areas suitable for fish utilization than the highland lakes.

The most economical sizes for planting should be approximately four centimeters for the basses, the guapote, and the chumbimba; and six to eight centimeters for the crappie and channel catfish.

It has been suggested that trout be introduced into certain Guatemala waters. It is believed that this should be approached with caution for it is expected that trout would not reproduce well because of the uniform temperatures throughout the year. They could be expected to grow normally in certain isolated streams where the waters do not rise above 20 degrees Centigrade, as in the Río Morazan above El Tablon, Río Blanco at Aquacatan, in the extreme headwaters of the Río Rabinal, the Río Suchiate, in the Cuchumatanes Mountains, as well as below large springs that maintain a suitable temperature range throughout the years.

Since potential trout waters are not concentrated in one geographic area, and since the trout population would have to be maintained by annual stocking, the program would be very expensive. I do not consider the trouble and expense warranted under present conditions. When a resident fishery technician becomes available, it should be worth his while to spend time in studying this phase of fishery development. The waters in the Cuchumatanes Mountains were not examined, but altitude and reduced soil erosion in this area indicate that they should be given consideration.

Hatchery Sites and Recommendations

It is recommended that no fish hatchery facilities be constructed unless the results of the test plantings in Lago Atitlan and Rio Matagua have been evaluated and found satisfactory. It is believed that the construction and operation of a hatchery may prove a waste of funds unless trained men are available to see that the fishes propagated are planted in the appropriate waters and in proper numbers. A considerable amount of technical training is needed by the personnel for the successful operation of a fish hatchery. Unless personnel can be trained in fishery management and hatchery operations as outlined in the discussion, "Administration of the Fishery Resources", the investment of funds in a fish hatchery may not be warranted.

The investigation indicates that the fresh water fishery resources of Guatemala may be increased by the introduction of fishes into many waters. For this purpose consideration has been given first to the native fishes, and second, to fishes of the United States which possess desirable qualities and give more promise of material contribution to the development of the fishery resources. If the program as outlined proves desirable and warrented, and adequate personnel can be trained to handle the program, it may be advisable in later years to construct a fish hatchery for the transportation of sufficient planting stock by plane from the United States would be extremely expensive and much less satisfactory. Since it may be desirable to propagate from four to six species, a number of small ponds containing one-tenth to two-tenths hectare (one-fourth to one-half acre) of surface water would be of greater value than a number of larger ponds containing the same or more water area. It is believed that 16 rectangular ponds of about one-tenth hectare (one-fourth acre) each, and 8 of approximately two-tenths hectare (one-half acre), each will be adequate for present and future needs. This will make a total of about 3.23 hectares (8 acres) of water. A superintendent, an assistant, and three or four laborers should be adequate for its operation and the maintenance of equipment and lawns.

With a station of this size, the more important waters should be stocked first. This would permit observations on results and permit methods of operation and management to be perfected before stocking became widespread. By the time the majority of natural waters have been developed, which may take 10 to 15 years, it is expected that many finca owners will have seen the possibilities of developing a source of local food fishes for their laborers by the construction of small ponds. Undoubtedly, in the future, Guatemala

will construct power and irrigation dams which will need stocking with fish. As these developments take place, much of the hatchery output can be used to develop the fisheries resources in them. The hatchery pools may be needed to determine the species best suited for propagating in small ponds constructed in fincas. To maintain satisfactory fishing over a period of years, "corrective stocking" undoubtedly will be necessary in some waters in order to maintain a proper ratio of predacious fishes to their supporting populations. For these reasons, it is believed that the construction of the hatchery should be on the basis of permanent operation.

The primary points to consider in selecting a hatchery site are as follows: (1) Sufficient clear water, not markedly different in its chemical make-up from the waters to be stocked, to operate 20 to 24 ponds with a total area of 3.23 surface hectares (8 surface acres) of water that will be drained and refilled about three times a year. The minimum amount of water needed would be about 100 liters (litros) per minute. Ponds in operation require only sufficient water to maintain levels but much time is saved if enough water is available to fill them quickly. (2) Sufficient area of relatively flat land (on which water can be obtained by gravity flow) for the construction of ponds, holding and equipment shed, shop, and residence. (3) A central location from which fish can be transported in a minimum of time to all important waters. In Guatemala, there will be a great advantage in the use of an airplane for stocking certain lakes. The availability of an airport, therefore, should be considered.

In the course of the survey, observations and inquiries were made regarding locations having suitable waters and land areas for hatchery development. Special consideration was given to a number of springs in the vicinity of Antigua, areas near San José de Pinula, the area below Laguna de Amatitlán, the springs at Apocentos near Chimaltenango, and the spring at Aguacatan, tributary to Río Blanco.

Apocentos.--This site is in the highlands at an altitude of 1,700 meters and about two kilometers from Chimaltenango. Its central location with respect to the waters to be stocked, and with respect to the present road system, is satisfactory.

About 0.22 cubic meters (eight cubic feet) per second of water can be obtained from springs emerging from porous sandstone, but not all of this water is above the best location for pools. It is estimated that about four to six hectares (10-15 acres) of pool area could be flooded by gravity from the spring. The water emerges at a temperature of 24 degrees Centigrade. It has a pH of 7.2; phenolphthalein alkalinity, 0; methyl orange alkalinity, 85 to 87 p.p.m.

About one kilometer above the proposed hatchery site, water is taken from a spring-fed stream through a diversion dam of concrete and brick. The water is diverted through a dirt flume to a water-wheel and generating plant at the proposed hatchery site. On March 27, 1946, a volume of 0.11 cubic meter (four cubic feet) per second of water was entering the flume, and 0.056 was reaching the generating plant. The loss by seepage was 0.055 cubic meter per second over a course of about two kilometers. As much of the land on the drainage area is cultivated, the water from the stream would be murky during the rainy season, June to November. The use of this water in ponds devoted to channel catfish and crappie might be advantageous. The water taken from the stream could be directed by gravity over an area of four to five hectares (10-15 acres) suitable for ponds. With improvement of the present dirt flume, adequate water would be available for fish ponds as well as for the generating plant. The temperature of the water in the stream at the diversion dam was 25 degrees Centigrade, at 4:30 p. m., March 27, 1946. The pH was 8.2, and methyl orange alkalinity, 72 parts per million. The water from the springs and the stream is suitable for fish cultural purposes, and is not markedly different from the waters in the majority of the streams and lakes to be stocked.

Since the site lies in a valley, an important factor to determine before further consideration is given to this location is whether the soil will hold water without undue loss from seepage. The irregularity of the land is such that it would be necessary to fit the ponds into the topography in order to reduce construction costs. This would undoubtedly result in an inefficient use of the land, and a station more difficult to operate than one properly located on more level terrain. It is recommended that no consideration be given to the construction of a hatchery at this location until a hatchery engineer has studied the problems involved.

Aguacatan.—Aguacatan is about 25 kilometers east of Huehuetenango. The spring has an estimated flow of 2.83 cubic meters (100 cubic feet) per second, a temperature of 15 degrees Centigrade, a pH of 7.2, and 179 parts per million of methyl orange alkalinity. There is an excellent expanse of flat land, which would permit almost unlimited pond development. The location of this site with respect to the better waters to be stocked is very poor. It is highly desirable that a hatchery be within six to eight hours travel time by loaded truck, of the waters to be planted. This ideal can not be realized with any one site in Guatemala. Aguacatan, however, is 10 to 30 hours by truck from the better waters to be stocked. Other problems involved here are the porosity of the soil and the possibility of extremely high flood waters covering site. A great advantage is the cool water temperature, which can be used to regulate spawning time.

Amatitlan.—Below Amatitlan, between the road to Escuintla and the Río Michatoya, is a relatively flat area where a fish hatchery could be constructed. The area begins about one-half kilometer or more below Laguna de Amatitlán, and extends for about two and one-half miles along the Río Michatoya. The precise location should be determined by a hatchery engineer, for the water source and the hatchery plan would be determined by the slope of the land and by bottom levels in Río Michatoya. There is adequate water in Río Michatoya, as it has a minimum flow of 1.68 cubic meters per second (60 cubic feet per second) or more during the dry season. It may also be feasible to flume the water from Laguna de Amatitlán. This would be preferable, but not necessary. The water used at the hatchery would have little effect on available water for irrigation and power purposes below, because all water used would be returned to the river.

The temperature of Río Michatoya below the lake was 20.5 degrees Centigrade on March 20, 1946. The temperature probably varies little throughout the year, for it flows directly from Laguna de Amatitlán. Rio Michatoya, about one-half mile below the lake, had a total alkalinity of 178 parts per million, and a pH of 8.0 on the above date.

This area appears more satisfactory for the location of a hatchery than any other examined. The land has a gentle slope, the water supply is satisfactory, and the soil appears less porous than at any of the other sites. A paved road leading to Guatemala City, 31 kilometers away, is nearby. Considering the road system leading to all parts of the Republic, the fishing waters nearby, and the airport at Guatemala City, a more centralized location would be difficult to find.

No sites observed, other than those mentioned above, have the prerequisites for a hatchery.

Salt-Water Commercial Fisheries

The primary purpose of the mission was to explore the factors involved in improving fresh-water fishing. As there was considerable interest in brackish and salt-water fishing, a brief general summary of conditions and observations are recorded here.

Pacific Ocean

No exploration or sampling was done in the Pacific Ocean, for the reason that the water is deep close inshore (Chart Number 9031, West Coast of Central America, Ocos River to San Juan del Sur, published by the Hydrographic Office, United States Navy, Washington, D. C.). Rather large areas of water six fathoms or less in depth are usually essential for profitable fishing for inshore fishes. Such areas along the Pacific Coast of Guatemala are extremely limited and are not protected from the open sea by cays or reefs. The most extensive area less than seven fathoms lies off San Luís, at the mouth of Río Samalá, and between San Luís and Champerico. The types of fishes found in such habitats are somewhat migratory, and the yield can be expected to fluctuate greatly from season to season depending upon changes in the routes and times of migration.

The offshore bottom areas less than 100 fathoms deep extend out a distance of 40 to 80 kilometers, but such waters are usually considered relatively unproductive in tropical seas. The ocean bottoms here do not have ridges, ledges, and rocks, which are associated with larger fish populations.

The offshore surface waters are extensive, and little is known about them. The evidence available indicates that schools of tuna are common 65 kilometers or more offshore, but their occurrence closer to shore is sporadic and undependable. The tunas, swordfish, sailfish and marlins usually make extensive seasonal migrations, while the kingfish, spanish mackerel, flying fish and dolphins have only limited migrations. Little is known about seasonal migrations in this area. Although the offshore fishes seem to offer commercial possibilities, their utilization requires suitable harbors and large investments in boats, fishing gear, and processing facilities. If an exploration of this area proved promising for the taking of large quantities of fish, there would remain the necessity of having a suitable harbor for basing a fishing fleet, a refrigeration and processing plant, fishing gear, seaworthy boats, and a market outlet for large quantities of fish.

Shark fishing in the Pacific areas has proven profitable on a small scale. The ports of San José and Champerico are open roadsteads, where it is difficult to operate small boats, especially during the rainy season (June to November). Judging by information obtained locally, the areas around the mouths of Río Samalá and Suchiate offer excellent shark fishing.

With the possible exception of the shark and tuna fisheries, the Caribbean coast offers more favorable conditions for commercial fishing than does the Pacific.

Caribbean Sea

The ports of Puerto Barrios and Livingston offer adequate harbor protection for a fishing fleet, and the number and quality of trained fishermen are greater than on the Pacific coast. There are approximately 180 kilometers of coastal waters, all of which are comparatively shallow, with sandy beaches, and muddy bottoms below the five or six fathom contour. Excellent commercial fishing areas are present between the Río Sarstun and the Río Dulce, over the bar at the mouth of Río Dulce, and eastward for some distance toward Puerto Barrios. Shallow areas extend from Puerto Barrios to Punta Manabique and Bahia de la Graciosa, but commercial fishing is not considered good in the latter area. Our seine hauls seemed to verify this, but it is believed that some experimental fishing to the west of Punta Manabique and on each side of Tongue Shoal at four to six fathoms might result in finding profitable fishing beds.

The excellent productivity of the Bahia de Amatique is due largely to the amounts of dissolved nutrient salts and silt washed into it by the Ríos Tamayo, Sarstun, Dulce and Agustin, and to the currents which carry these counter clockwise around the bay. Ox Tongue Shoal is a direct result of the deposition of silt from these rivers.

The principal fishes caught at Livingston are the robalos (Centropomus) and pargos (Lutjanus). These are caught primarily by seining and spearing and are well liked on the Guatemala City market.

Snappers (pargos) can be taken in large numbers in June and July, when they come into shallow waters to spawn. There are probably two or three species, and the habits apparently differ considerably. Snappers are taken in seines in fair numbers at different times during the year.

Robalos frequent the mouths of rivers, and are caught in beach seines, by spearing, and on hand lines. They are reported to enter the Río Dulce in large numbers in early January, and are taken around the mouths of rivers in moderate numbers in April. They are caught in some places throughout the year and are the most important fish taken at Livingston.

In August, the jurel or crevally (Caraux hippos) appear in schools near the mouths of rivers where they can be taken in large numbers with beach seines. They ascend the Río Dulce as far as the lower end of Lake Izabal.

The jew fish (judio) comes inshore to spawn in July and August.

Mullet (Mugil) are reported to enter Guatemalan waters in February and again in August and September. Apparently they are not utilized extensively. This is due, probably, to the fact that the types of fishing gear used are not suitable for taking mullet.

Mackerel are taken on troll lines, and are reported to occur in schools, but information as to dates is conflicting.

In addition to the species already mentioned, there are a number of others of less importance commercially. Some of these, such as barracuda (picuda), kingfish (sierra), tarpon (sabalo), and dolphin (dorado) are important sport fishes.

There are reports of excellent shark fishing just off Punta Manabique to the west; also from Punta Manabique to the mouth of Río Motagua. The latter area is open and often rough. It is doubtful that shark fishing can be conducted there profitably.

The offshore fishes, such as tuna and swordfish, are considerably distant from territorial waters and are seasonal in occurrence. It is unlikely that they will be considered for exploitation in the near future, because simpler and less expensive equipment is suitable for taking inshore forms. The inshore fishes appear to offer excellent opportunities for immediate exploitation. The primary problems involved are refrigeration and transportation.

Commercial fishermen will find the following charts and publications helpful for fishing in Bahia de Amatique and Gulfo de Honduras:

Chart No. 1496 - Central America, Gulf of Honduras with Zapotilla Cays. Published by the Hydrographic Office, United States Navy, Washington, D. C. Price 50 cents. This chart gives soundings for areas adjacent to Guatemala; also for the Rio Dulce and El Golfete.

Chart No. 1497 - Central America, British Honduras, Ranguna Cay to Columbus Cay including Inner Channel and Glover Reef. Published by the Hydrographic Office, United States Navy, Washington, D. C. Price 50 cents.

Chart No. 1498 - Central America, British Honduras, Approaches to Belize. Published by the Hydrographic Office, United States Navy, Washington, D. C. Price 50 cents.

Chart No. 1973 - Central America, Eastern Coast, River Dulce in Guatemala. Published by the Hydrographic Office, United States Navy, Washington, D. C. Price 20 cents. This chart includes Río Dulce, El Golfete, and lower Lago Izabal.

Bulletin No. 21 - The Fisheries of British Honduras, by Ernest F. Thompson. Published by Advocate Company, Bridgetown, Barbados. Price 10 cents.

Future Development of the Marine Fisheries

The territorial waters of Guatemala in the Caribbean Sea are not extensive, but it is safe to say that the fisheries are far from being completely exploited. Many of the methods and much of the equipment used are crude and could be greatly improved. The ports of Livingston and Puerto Barrios are within easy reach of well-known fishing grounds outside territorial waters, such as the Campeche Banks, Mosquito Coast, Rosaline Bank, Serrana and Seranilla Cays, which are among the most fertile grounds in the Caribbean and should not be overlooked in considering the future exploitation of the marine fisheries.

The distribution of fish on the limited home grounds is not well known, and the possibilities available outside territorial waters on more distant banks are unexplored, for the most part, although they are of considerable magnitude. The potential supply of fish is more than sufficient for local requirements.

The first requirement for increase in production is a thorough survey of the home waters and the cays and banks within fishing range of Puerto Barrios and Livingston. The survey of the home waters would be of chief interest to Guatemala, but the survey of more distant waters would be of interest to neighboring countries of the Caribbean area.

If such a survey could be financed cooperatively by all interested countries, so that information on the location of the better fishing banks and the seasonal fluctuations of fish were known, it would be of inestimable value in exploiting the fishery resource of the area. The information needed from such a survey should include the following.

1. Precise information should be obtained on the time, place, and extent of the seasonal concentrations and migrations of bottom and pelagic fish and other aquatic forms such as shrimp, lobsters, and turtles.

2. Experiments should be made to determine the most satisfactory gear and equipment to be used, such as small otter trawls with various modifications for local conditions. The use of small purse seines capable of being used on unspecialized vessels should be perfected.

Until a fair knowledge has been obtained of the species, their distribution, and habits, experiments toward perfecting equipment would be no more than preliminary. To determine the distribution of species and their seasonal migrations would require one or two years, and subsequent testing of various types of gear would require at least another year. To be of most value the survey should extend over at least three years. The survey party should be provided with a vessel large enough to handle the various types of gear, fully powered, and provided with mechanical cold storage. In addition to the technicians trained for such studies, the services of a competent commercial fisherman should be obtained to direct the actual fishing operations.

Development of Fishing as a Tourist Attraction

Guatemala offers many attractions for tourists. For the sport fisherman the areas around Livingston, Lago Izabal, and Puerto Barrios offer extraordinary fishing and scenic attractions. El Golfete, Lago Izabal, Río Dulce, and the waters of the coast offer excellent tarpon and salt-water fishing. These areas afford opportunities for a holiday of fishing and sailing unsurpassed in the Caribbean.

The potentiality of the tourist trade may be greater by far than that of commercial fishing. Before tourist potentials can be realized, hotel accommodations, fishing boats, guides and equipment would have to be provided. The opportunity for the development of sport fishing at lakes Atitlán, Ayarza, and Amatitlán, and on the lagoons of the Pacific Coast should not be overlooked. Last, and far from least, the sport facilities which the Republic offers would have to be made known to the traveling public through adequate publicity.

Administration of the Fishery Resources

The authority for making regulations regarding wildlife and fisheries should be granted by law to a single agency of the central Government. This would facilitate the adoption and enforcement of equitable regulations throughout the Republic. It is believed that an administrative organization comparable to certain of the State conservation departments in the United States would be practicable, but many changes would be necessary to adapt them to the needs in Guatemala. On September 10 and 11, 1934, the International Association of Game, Fish and Conservation Commissioners, meeting at Montreal, Canada, compiled a Fish and Game Administrative Code for guidance in establishing more adequate game and fish administrative organizations. This code is obtainable in bulletin form from the Izaak Walton League of America. It is suggested that a copy be obtained, and the code modified as needed to make it a suitable instrument for use in the Republic. If the principles of this code are used as a foundation upon which to build the administrative organization, the Republic will profit materially from the experience of other countries.

There is a good opportunity to improve and develop the fresh-water fishery resources of Guatemala so that they will be an important food resource. The opportunities to attract tourists by providing satisfactory sport fishing are excellent. The progress made in the years ahead will depend largely on how well the resources are managed. It is not conceivable that it can be well managed without the assistance of trained technicians. The training of two or more Guatemalan students in modern techniques in the fields outlined below is important.

1. Fish propagation: Training for the operation of a fish hatchery, and in the distribution and planting of fish.

One or two men should be trained in this field. The method of training would depend upon the ability of the individuals, and their previous training and experience. On-the-job training at different fish cultural stations in the United States in the propagation methods pertaining to the production of channel catfish, crappie, smallmouth and largemouth bass would be essential. Training for a period of one year would be advisable, and six to nine months the minimum.

2. Fish management.

It is essential that at least one person be trained in this field. His training should be a combination of on-the-job training and biological studies at a university which gives courses in identifying fishes, techniques of fishery surveys, recording and interpreting data, and formulating stocking plans. This technician will be the one to supervise the program and make recommendations for changes in plans and policies. One or two years would be essential, and four years would be desirable.

3. Commercial fishing.

Jobs are available for several men having a knowledge of commercial fisheries, gear, and boats. On-the-job training for students, such as working on fishing boats off the California coast, the Gulf of México, and Chesapeake Bay, and on fresh water areas such as Lake George and the upper and lower Mississippi would be ideal. A knowledge of processing plants and marketing would be highly desirable also.

General Suggestions on Fresh-Water Fishery Regulations

Restrictive regulations in addition to those noted below may be needed as the resource develops.

1. Hook-and-line fishing. We can see no reason why any restrictions on the number of fish taken per day or on size limits are needed at the present time. The native species and those suggested for introduction are prolific; consequently, intensive fishing is desirable if proper utilization is to be obtained.

2. Closed seasons. If the fishery is to be utilized properly, there probably should not be any closed seasons. Fishing during the spawning season should not be discouraged, because this is a time when some of the mojarras can be taken by hook-and-line fishing to better advantage than at any other period. In fact, many of the mojarras are difficult to take by hook-and-line fishing during most of the year.

3. Nets, traps, and other gear. Atarrayas are used throughout the Republic. It is believed that they should be permitted without restrictions in all waters except Laguna Amatitlán and Lago Atitlán. In these two lakes it may be advisable to prohibit the use of the atarrayas on Sundays and other holidays when large numbers of sport fishermen are using the waters. Otherwise, antagonism may develop between the sportsmen and groups using the atarrayas. After bass fishing has been developed, it may be necessary to prohibit the use of the atarraya during the height of the bass spawning season in the highland lakes, but such prohibition would not be necessary in the coastal lagoons.

Basket traps (Nasas) should be permitted in all streams and coastal lagoons. It is believed that their use in the highland lakes of the interior should not be permitted, because of the conflict with the intensive sport fishing that is expected to develop if bass and crappie are introduced.

Wiers and corrals are used in some of the streams but are inefficient. There is no reason why their use in coastal streams and lagoons should be restricted.

Nets. No restrictions on the use of gill-nets, trammel nets, and haul seines should be made for fishing in the coastal lagoons. Their use in the highland lakes should not be permitted, as they would interfere with the intensive recreational use that is expected to develop after the introduction of bass and crappie.

Spears and harpoons are used commonly in the coastal lagoons and mountain streams for fishing at night with the aid of lights. It is believed that their use should be permitted, for this appears to be an important method by which utilization of the fishery resource may be obtained.

The costs of permits and license fees for fishing should be uniform throughout the Republic, and cheap enough to permit everyone to utilize the fishery resource.

The use of poisons, electric seines, and explosives should be prohibited except for essential studies made by authorized technical personnel.

Marine Fisheries

The author is not aware of any existing regulations regarding the marine and brackish water fisheries. One note of warning should be made, and that concerns the frequent tendency towards unnecessary regulation of fisheries operations. Whenever the yield of fisheries decline, there is a tendency to attempt to remedy the situation by rules and regulations restrictive to fishing effort and enterprise. Often the steps taken are based on little understanding of the phenomena involved. It is assumed too often that human agency is the sole or primary cause of the adverse change, when almost always the cause is periodic natural fluctuations in abundance. When human agency is the cause, the steps taken to right the situation are often incapable of achieving any desirable effect, and sometimes are harmful.

It is urged that no restrictive regulations be imposed upon salt-water fisheries in Guatemalan waters until an exhaustive study has been made by a qualified biologist. Preconceived ideas, prejudice, and foreign regulations should not be used as a basis for formulating Guatemalan laws. All regulations should be based upon an adequate knowledge of the pertinent conditions in the specific waters involved.

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List of the More Important Inland Fishes of Guatemala

The following list of local or common and scientific names of inland fishes of Guatemala was prepared by Dr. Robert R. Miller, Associate Curator of Fishes, United States National Museum.

Local or common name	Scientific name
Tiburon; Shark	Carcharhinus
Pez Sierra; Sawfish	Pristis
Machora; Garfish	Lepisosteus tropicus (Gill)
Sabalo; Tarpon	Tarpon atlanticus Cuvier and Valenciennes
Pepesca	Astyanax fasciatus (Cuvier)
Plateada	Roeboides salvadoris Hildebrand
Machaca	Brycon guatemalensis Regan
Bagre; Marine Catfish	Galeichthys assimilis (Günther)
Bagre; Marine Catfish	Galeichthys caerulescens (Günther)

Local or common name (con't.)	Scientific name (con't.)
Pez Vaca; Gafftopsail	Bagre marinus (Mitchell)
Juilin	Rhamdia guatemalensis (Günther)
Pupo, Bute, Gulumina	Profundulus guatemalensis (Günther)
Pescadito	Poecilistes pleurospilus (Günther)
Pescadito	Mollienisia sphenops (Cuvier and Valenciennes)
Cuatro-ojo; Four-eyed Fish	Anableps dowei Gill
Robalo; Snook	Centropomus undecimalis (Bloch)
Robalo; Snook	Centropomus ensiferus Poey
Robalo; Snook	Centropomus pectinatus Poey
Robalo; Snook	Centropomus nigrescens (Günther)
Robalo; Snook	Centropomus robalito Jordan and Gilbert
Pargo; Red Snapper	Lutjanus colorado (Jordan and Gilbert)
Lisa; Mullet	Mugil cephalus Linnaeus
Tepemechin; Mountain Mullet	Agonostomus monticola (Bancroft)
Cuyamel; Jumping Mullet	Joturus pichardi Poey
Jurel; Skipjack	Caranx hippos (Linnaeus)
Roncador	Pomadasys crocro (Cuvier and Valenciennes)
Mojarra	Cichlasoma godmanni (Günther)
Mojarra	Cichlasoma microphthalmum (Günther)
Mojarra	Cichlasoma guttulatum (Günther)
Mojarra	Cichlasoma irregulare (Günther)
Chumbimba	Cichlasoma maculicauda Regan
Serica Negra	Cichlasoma nicrofasciatum (Günther)
Mojarra Negra	Cichlasoma macracanthum (Günther)
Mojarra	Cichlasoma spilurum (Günther)
Mojarra	Cichlasoma aureum (Günther)
Guapote	Cichlasoma motaguense (Günther)
Ixtatahua	Cichlasoma trimaculatum (Günther)
Mojarra	Cichlasoma salvini (Günther)
Mojarra	Petenia splendida (Günther)
Guavina	Gobiomorus dormitor Lacepede
Guavina	Gobiomorus maculatus (Günther)
Dormilon	Awaous taiasica (Lichtenstein)
Dormilon	Awaous transandeanus (Günther)

Table No. 1 Compilation of Temperature and Chemical Data from Streams. See Table No. 4 and Map No. 3 for Points where Data were Obtained.

No.*	Name of Stream	Date	Hour	Temperature				pH	Alkalinity	
				Air		Water			Phenolphthalein	Methyl Orange
				C	F	C	F			
1	Rio Grande de Mita	3/15/46	10:00 A.M.	25.5	78	26.6	80	8.1	8 P.P.M.	107 P.P.M.
2	Rio Tehuapa	3/15/46	9:30 A.M.	23.3	74	25.5	78	7.8	- - - -	- - - -
3	Rio De Paz	3/16/46	11:00 A.M.	24.4	76	26.1	79	8.2	5	87
4	Rio De Los Esclavos	4/20/46	11:00 A.M.	30.0	86	28.8	84	8.2	10	97
5	Rio De Los Esclavos	3/16/46	7:00 A.M.	18.8	66	21.6	71	7.6	0	89
6	Rio Escalante	3/12/46	8:00 A.M.	24.4	76	19.4	68	7.6	0	85
7	Rio Escalante	3/12/46	12:00 Noon	27.7	82	22.2	72	8.2	9	76
8	Rio Escalante	3/12/46	4:30 P.M.	27.7	82	25.0	77	---	- - - -	- - - -
9	Quebrada Canas	3/12/46	2:30 P.M.	24.4	76	26.6	80	8.2	8	67
10	Rio Toltecate	4/19/46	10:00 A.M.	28.8	84	28.3	83	7.5	- - - -	- - - -
11	Rio Pajal	4/19/46	9:00 A.M.	28.8	84	23.3	74	7.8	- - - -	- - - -
12	Rio Aguacapa	4/22/46	6:00 P.M.	28.8	84	25.5	78	7.8	0	123
13	Rio Aguacapa	4/18/46	3:00 P.M.	31.1	88	28.8	84	---	12	138
14	Rio Matapa	4/18/46	11:30 A.M.	30.0	86	28.8	84	8.3	21	142
15	Rio Michatoya	4/18/46	9:30 A.M.	30.0	86	25.0	77	8.0	5	44
16	Rio Villalobus	3/18/46	1:00 P.M.	24.4	76	24.4	76	7.6	- - - -	- - - -
17	Rio Guacalate	3/20/47	7:30 A.M.	25.5	78	25.5	78	8.2	0	110
18	Rio Achihuate	3/20/47	4:15 P.M.	34.4	94	28.8	84	---	8	77
19	Rio Colojate	3/21/47	9:00 A.M.	26.6	80	25.5	78	---	0	78
20	Rio Acome	3/21/47	12:00 Noon	32.7	91	28.8	84	8	0	109
21	Rio Obispo	3/21/47	- - -	----	--	----	--	---	- - - -	- - - -
22	Rio Pantaleon	3/21/47	2:30 P.M.	28.8	84	27.7	82	---	- - - -	- - - -
23	Rio Coyolate	3/21/47	4:15 P.M.	22.7	83	24.4	76	8.2	5	83
24	Rio Madre Vieja	3/22/47	9:15 A.M.	25.5	78	23.3	74	8.4	13	140
25	Rio Zajor De La Arena	3/25/47	4:00 P.M.	32.2	90	33.3	92	---	0	85
26	Rio Moca	3/26/47	9:00 A.M.	27.7	82	27.2	81	7.9	1	72
27	Rio Cutzan	3/26/47	10:15 A.M.	31.6	89	26.6	80	8.2	3	50
28	Rio Panan	3/26/47	11:00 A.M.	27.7	82	25.0	77	7.0	9	48
29	Rio Nagualate	3/26/47	11:20 A.M.	27.7	82	25.0	77	7.8	1	56
30	Rio Tilapa	3/27/47	12:30 P.M.	29.4	85	28.8	84	8.0	3	50
31	Rio Nil	3/27/47	3:30 P.M.	26.6	80	27.2	81	7.9	0 P.P.M.	47 P.P.M.
32	Rio Naranjo	3/28/47	10:30 A.M.	26.6	80	26.6	80	7.9	4	51
33	Rio Nahuatan	3/28/47	1:00 P.M.	36.6	98	27.7	82	---	- - - -	- - - -
34	Rio Nahuatan	3/28/47	2:00 P.M.	28.8	84	27.2	81	8.1	10	25
35	Rio Suchiate	3/29/47	3:00 P.M.	32.2	90	32.2	90	7.6	0	48
36	Rio Cabus	3/30/47	11:00 A.M.	25.5	78	23.3	74	8.0	3	42
37	Rio Petacalapa	3/30/47	9:00 A.M.	26.6	80	24.4	76	7.2	0	24
38	Rio Selegua	5/12/46	9:00 A.M.	16.6	62	17.7	64	---	- - - -	- - - -

Table No. 1 (continued)

No*	Name of Stream	Date	Hour	Temperature				pH	Alkalinity	
				Air		Water			Phenolph-thalein	Methyl Orange
				C	F	C	F			
39	Rio Blanco	5/12/46	1:00 P.M.	26.6	80	15.5	60	7.2	1	178
40	Rio Negro	5/3/46	2:30 P.M.	22.2	72	26.1	79	8.1	- - - -	- - - -
41	Rio Uspantan	5/3/46	11:00 A.M.	22.2	72	18.8	66	8.0	- - - -	- - - -
42	Rio Chixoy	5/2/46	- - - -	----	--	----	--	---	- - - -	- - - -
43	Rio Rabinal	3/24/46	11:00 A.M.	23.3	74	17.2	63	7.9	0	4
44	Rio Rabinal	3/23/46	8:45 A.M.	27.7	82	21.9	70	---	- - - -	- - - -
45	Rio Salama	4/29/46	1:00 P.M.	27.7	82	25.5	78	7.6	5	90
46	Rio San Jeronimo	4/29/46	7:30 A.M.	26.1	79	20.5	69	7.0	0	43
47	Rio Carchela	4/23/47	9:30 A.M.	22.2	72	21.1	70	8.0	0	104
48	Rio Cahabon	5/6/47	4:00 P.M.	24.4	76	21.1	70	8.0	4	140
49	Rio Cahabon	5/6/47	2:00 P.M.	25.5	78	20.5	69	8.0	5	140
50	Rio Cahabon	4/30/46	11:00 A.M.	32.2	90	31.1	88	8.2	10	125
51	Rio Semui	4/30/46	2:30 P.M.	25.5	78	27.7	82	8.2	8	111
52	Rio Tres Aquas	4/30/46	3:30 P.M.	27.7	82	26.6	80	---	- - - -	- - - -
53	Rio Polychic	5/1/46	11:00 A.M.	27.7	82	20.5	69	8.2	16	135
54	Rio Polychic	4/30/46	3:00 P.M.	27.7	82	25.5	78	7.8	10	85
55	Rio Polychic	4/9/46	4:00 P.M.	33.8	93	27.2	81	7.6	10	96
56	Rio Dulce	4/4/46	- - - -	Variable with tidal action						
57	Rio Sarstun	4/30/47	10:00 A.M.	26.6	80	26.6	80	7.6	3	98
58	Rio Motagua	5/4/46	9:00 A.M.	16.6	62	16.6	62	---	- - - -	- - - -
59	Rio Motagua	3/23/46	7:45 A.M.	17.7	64	18.8	66	8.2	0	21
60	Rio Motagua	4/14/46	- - - -	---	--	----	--	---	- - - -	- - - -
61	Rio Motagua	4/26/46	2:00 P.M.	32.2	90	31.1	88	8.2	17 P.P.M.	186 P.P.M.
62	Rio Motagua	4/14/46	- - - -	----	--	----	--	---	- - - -	- - - -
63	Rio Belejeya	3/23/46	12:30 P.M.	28.8	84	22.2	72	---	- - - -	- - - -
64	Rio De Las Vacas	3/28/46	12:00 Noon	24.4	76	24.4	76	8.2	26	147
65	Rio Purgatoria	4/24/46	6:30 A.M.	21.1	70	17.7	64	8.1	6	293
66	Rio Platanos	4/24/46	7:00 A.M.	21.1	70	17.7	64	8.1	6	293
67	Rio Agua Caliente	4/24/46	- - - -	----	--	----	--	---	- - - -	- - - -
68	Rio Morazan	4/28/46	- - - -	----	--	----	--	---	- - - -	- - - -
69	Rio Morazan	5/8/47	10:00 A.M.	23.3	74	25.5	78	8.0	0	68
70	Rio Tato	4/28/46	7:45 A.M.	25.5	78	23.3	74	7.6	8	109
71	Rio Chimalapa	4/25/46	12:00 Noon	30.0	86	32.7	91	---	- - - -	- - - -
72	Rio Riachenlo	4/27/46	2:30 P.M.	30.0	86	27.7	82	7.6	7	216
73	Rio Viejo	4/25/46	1:00 P.M.	23.3	92	30.0	86	8.1	11	92
74	Rio Hundo	4/25/46	6:00 A.M.	21.6	71	22.2	72	7.2	0	23
75	Rio Zacapa	4/25/46	7:00 A.M.	23.8	75	26.1	79	7.8	7	187
76	Rio Xutaque	5/8/46	- - - -	----	--	----	--	---	- - - -	- - - -

*Numbers refer to precise location of stream sections, Table 4.

Table No. 2 Stream Data Showing Size, Water Flow, and Pool Evaluations. See Table No. 4 and Map No. 3 for Location of Stream Sections Where Data Were Obtained

No.*	Average Width in Feet	Average Width in Meters	Estimated Flow in Cu. Ft. per sec.	Estimated Flow in Cu. Meters per sec.	Percent Stream Area in Pools	Average Pool Depth in Feet	Average Pool Depth in Meters	Pool Grade
1	60	18	225	6.36	50	5	1.5	A
2	15	4	45	1.27	--	1	0.3	C
3	20	6	30	0.84	40	3	0.9	C
4	150	46	150	4.24	60	6	1.8	A
5	70	21	90	2.54	70	4	1.2	A
6	55	17	55	1.55	40	3	0.9	B
7	36	11	45	1.27	30	3	0.9	C
8	30	9	30	0.84	25	2	0.6	C
9	20	6	15	0.42	25	2	0.6	C
10	25	8	15	0.42	40	2	0.6	C
11	30	9	85	2.40	50	3	0.9	A
12	30	9	85	2.40	20	3	0.9	C
13	60	18	120	3.39	50	4	1.2	A
14	30	9	45	1.27	50	3	0.9	A
15	50	15	100	2.83	40	7	2.1	A
16	12	4	5	0.14	40	1	0.3	C
17	20	6	40	1.13	40	2	0.6	C
18	80	27	500	14.15	60	10	3.0	A
19	20	6	18	0.50	60	3	0.9	A
20	30	9	40	1.13	60	3	0.9	A
21	25	8	40	1.13	15	3	0.9	C
22	25	8	75	2.12	15	2	0.6	C
23	50	15	1,000	28.30	60	8	2.4	A
24	50	15	3,000	84.90	10	4	1.2	C
25	15	4	10	0.28	30	1	0.3	C
26	75	23	450	12.73	70	4	1.2	A
27	50	15	200	5.66	60	4	1.2	A
28	40	12	220	6.22	50	3	0.9	A
29	75	23	450	12.73	20	7	2.1	C
30	70	21	600	16.98	85	6	1.8	A
31	50	15	700	19.81	50	5	1.5	A
32	150	46	700	19.81	60	6	1.8	A
33	40	12	180	5.09	50	4	1.2	A
34	40	12	300	8.49	50	5	1.5	A
35	500	152	1,000	28.30	20	3	0.9	C
36	70	21	500	14.15	30	4	1.2	B
37	50	15	150	4.24	60	4	1.2	A
38	35	11	30	0.84	30	3	0.9	C

Table No. 2 (Continued)

No.*	Average Width in Feet	Average Width in Meters	Estimated Flow in Cu. Ft. per sec.	Estimated Flow in Cu. Meters per sec.	Percent Stream Area in Pools	Average Pool Depth in Feet	Average Pool Depth in Meters	Pool Grade
39	25	8	120	3.39	20	4	1.2	C
40	90	27	430	12.17	40	5	1.5	B
41	15	4	18	0.51	50	2	0.6	B
42	90	27	540	15.28	20	15	4.5	C
43	15	4	6	0.17	60	3	0.9	B
44	16	5	4	0.11	60	1	0.3	C
45	45	14	50	1.41	40	3	0.9	B
46	40	12	80	2.26	50	4	1.2	A
47	25	8	50	1.41	30	2	0.6	C
48	30	9	150	4.24	50	5	1.5	A
49	35	11	200	5.66	60	3	0.9	A
50	150	46	100	28.30	90	15	4.5	A
51	25	8	8	0.22	80	4	1.2	A
52	50	15	120	3.39	70	6	1.8	A
53	25	8	60	1.69	20	3	0.9	C
54	225	68	1,500	42.45	100	10	3.0	A
55	225	68	3,000	84.90	100	15	4.5	A
56	240	73	10,000	283.00	100	20	6.0	A
57	140	43	14,000	396.20	100	10	3.0	A
58	15	4	12	0.34	40	2	0.6	B
59	70	21	400	11.32	50	8	2.4	A
60	80	24	500	14.15	60	6	1.8	A
61	225	68	600	16.98	85	6	1.8	A
62	300	91	600	16.98	5	2	0.6	C
63	20	6	40	1.13	50	4	1.2	A
64	30	9	20	0.56	30	2	0.6	C
65	40	12	160	4.52	50	5	1.5	A
66	60	18	160	4.52	50	5	1.5	A
67	30	9	50	1.41	50	3	0.9	A
68	30	9	70	1.98	40	3	0.9	B
69	35	11	35	0.99	40	2	0.6	B
70	30	9	30	0.84	25	4	1.2	B
71	20	6	20	0.56	40	3	0.9	B
72	50	15	60	1.69	40	4	1.2	C
73	40	12	30	0.84	40	4	1.2	B
74	40	12	200	5.66	50	4	1.2	A
75	80	24	200	5.66	85	5	1.5	A
76	45	14	175	4.95	30	5	1.5	B

*Numbers refer to precise location of stream sections, Table 4.

Table No. 3 Stream Data Showing Composition of Riffles at Points Indicated in Table No. 4 and Map No. 3

No.*	Bedrock	Boulders	Rubble	Gravel	Sand	Silt
1	—	50	40	5	5	—
2	—	—	—	—	—	—
3	—	20	10	10	60	—
4	—	40	40	15	5	—
5	—	55	20	10	15	—
6	—	15	25	30	30	—
7	—	35	20	10	35	—
8	—	40	20	15	25	—
9	—	30	40	20	10	—
10	—	20	35	15	30	—
11	—	60	20	15	5	—
12	—	25	50	15	10	—
13	—	10	10	20	60	—
14	—	40	30	15	10	5
15	—	40	40	10	10	—
16	—	5	40	20	35	—
17	—	10	10	35	40	5
18	—	40	20	20	15	5
19	5	15	15	30	30	5
20	—	10	20	35	30	5
21	—	45	35	10	10	—
22	—	30	20	10	30	10
23	—	40	20	10	30	—
24	—	55	15	10	20	—
25	—	—	—	—	50	50
26	—	15	15	20	40	10
27	—	20	20	15	20	25
28	—	25	20	15	30	10
29	—	60	20	10	10	—
30	5	5	10	20	60	—
31	—	20	40	30	10	—
32	—	25	25	25	25	—
33	—	25	25	20	30	—
34	—	30	20	30	20	—
35	—	—	—	—	100	—
36	—	35	40	20	5	—
37	—	20	25	30	30	—
38	—	25	20	20	30	5

Table No. 3 (Continued)

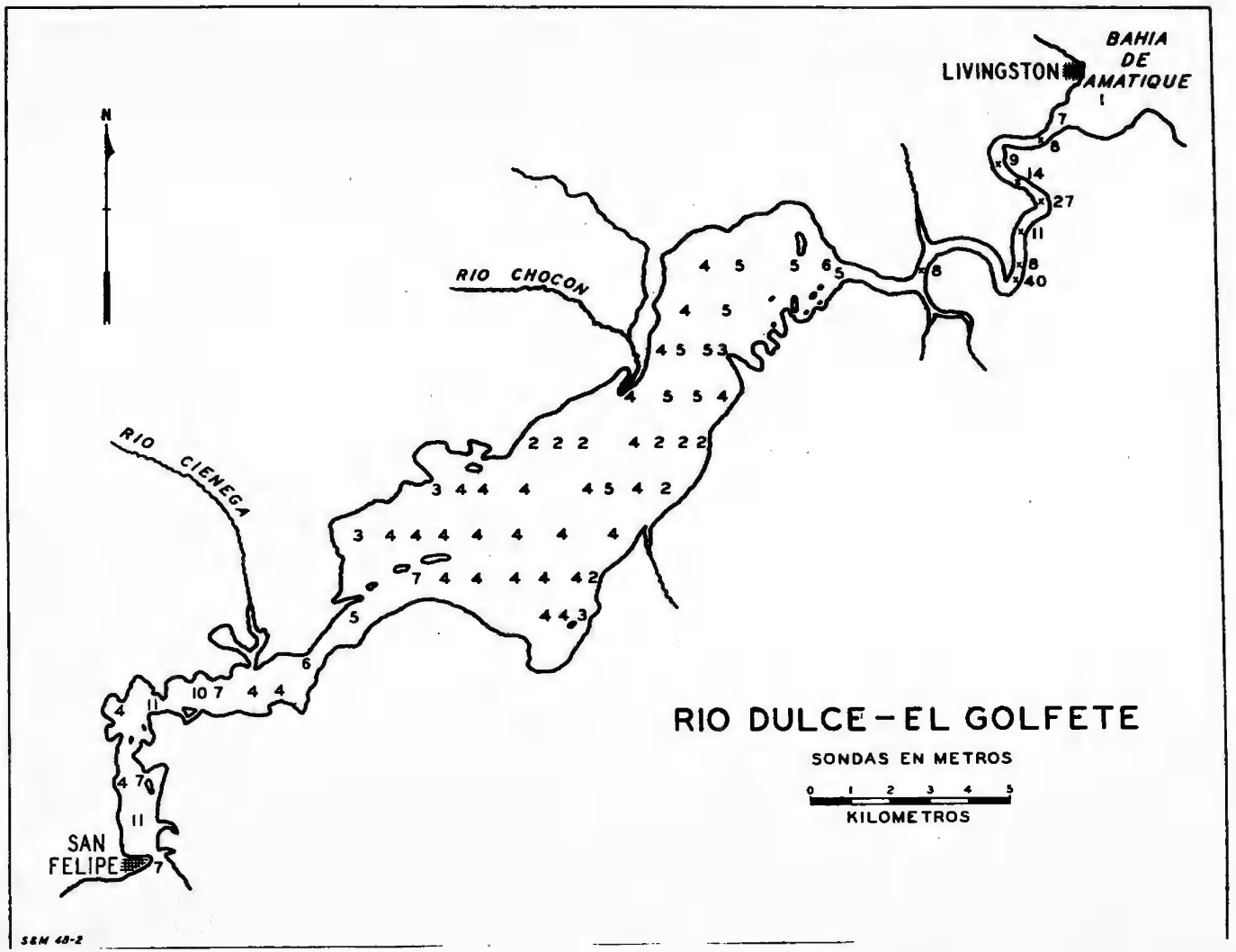
No.*	Bedrock	Boulders	Rubble	Gravel	Sand	Silt
39	--	30	40	15	15	--
40	--	5	5	50	40	--
41	--	30	50	15	5	--
42	15	40	30	10	5	--
43	--	60	15	5	20	--
44	--	--	5	5	90	--
45	--	10	40	40	10	--
46	--	30	30	15	25	--
47	5	25	50	15	5	--
48	--	10	40	20	30	--
49	--	15	50	25	5	5
50	--	--	5	20	70	5
51	--	--	25	25	45	5
52	--	20	15	35	30	--
53	--	50	30	15	5	--
54	--	--	--	5	80	15
55	--	--	--	5	75	20
56	10	--	--	30	60	--
57	2	10	20	40	25	3
58	--	15	25	40	20	--
59	--	40	15	5	40	--
60	--	25	5	20	50	--
61	--	10	10	20	60	--
62	--	--	--	--	100	--
63	--	60	15	10	15	--
64	--	10	45	30	15	--
65	--	50	35	10	5	--
66	--	50	35	10	5	--
67	--	40	40	10	10	--
68	--	40	40	10	10	--
69	5	40	35	15	5	--
70	--	60	20	15	5	--
71	--	20	50	20	10	--
72	--	35	30	25	10	--
73	--	20	25	30	25	--
74	--	25	25	25	25	--
75	--	10	20	35	35	--
76	5	40	40	10	5	--

*Numbers refer to precise location of stream sections, Table 4.

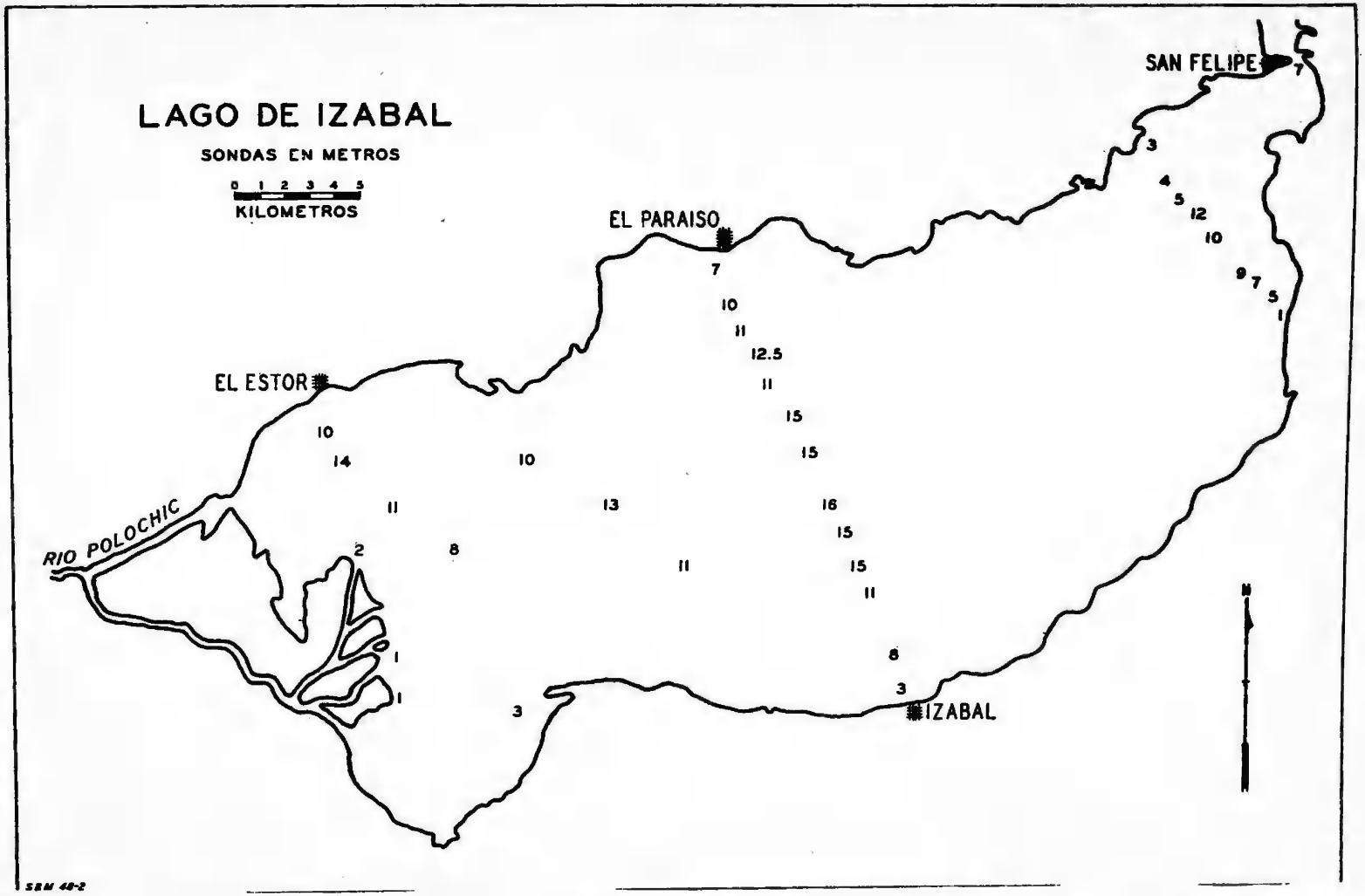
Table No. 4 Locations Where Stream Data of Tables Nos. 1, 2 and 3 Were Obtained. Also See Map No. 3.

No. 1 Río Grande de Mita or Río de Mita tributary to Río Ostua. One kilometer west of Asunción Mita.
No. 2 Río Tehuapa. Five kilometers north of Laguna de Atescatempa.
No. 3 Río de la Paz. Below forks at San Diego. Two kilometers southwest of Jutiapa.
No. 4 Río de los Esclavos. Ten miles north of Cerritos.
No. 5 Río de los Esclavos. At Esclavos.
No. 6 Río Escalante. At Santa Rosa de Lima.
No. 7 Río Escalante. At Casillas.
No. 8 Río Escalante. Near mouth of North Prong of Río Escalante.
No. 9 Quebrada Canas. Tributary of Río San Gregorio. Five kilometers west of Santa Rosa de Lima.
No. 10 Río Toltecate. East of Chiquimulilla.
No. 11 Río Pajal. One kilometer west of Pajal. Departmento Santa Rosa.
No. 12 Río Aguacapa. Below fork of stream five kilometers south of La Vega.
No. 13 Río Aguacapa. At road crossing three kilometers east of Brito.
No. 14 Río Matapa. At road crossing 15 kilometers southeast of Escuintla. Tributary to Rio Michatoya.
No. 15 Río Michatoya. At road crossing 14 kilometers southeast of Escuintla.
No. 16 Río Villalobos. Below road crossing 9 kilometers south of Guatemala City.
No. 17 Río Guacalate. Two kilometers southwest of Masagua.
No. 18 Río Achihuate. At Guachipilin. Seven kilometers southwest of Esquintla.
No. 19 Río Colojate. Five kilometers south of La Democracia.
No. 20 Río Acome. At La Nuevo. Four kilometers northeast of La Gomera.
No. 21 Río Obispo. At Obispo. Three kilometers north of La Democracia.
No. 22 Río Pantaleon. At Pantaleon.
No. 23 Río Coyolate. One kilometer east of Primavera.
No. 24 Río Madre Vieja. One kilometer west of Patulul.
No. 25 Río Zanjon de la Arena. Four kilometers south of the town of Rio Bravo.
No. 26 Río Moca. One kilometer south of Moca.
No. 27 Río Cutzan. Three kilometers north of Nagualate.
No. 28 Río Panan. At San Miguel Penan. Seven kilometers east of Mazatenango.
No. 29 Río Nahgualate. One kilometer west of San Miguel Penan. Six kilometers east of Mazatenango.
No. 30 Río Tilapa. At Caballo Blanco. Twenty kilometers west of Retalhuleu.
No. 31 Río Nil. Eight kilometers west of Retalhuleu.
No. 32 Río Naranjo. Two kilometers southeast of Pajapita.
No. 33 Río Nahuatan (Pajapa). Two kilometers northwest of Pajapita.
No. 34 Río Nahuatan. Thirteen kilometers northwest of Pajapita.
No. 35 Río Suchiate. At Ayutla.
No. 36 Río Cabus. One kilometer southeast of Malacatan.
No. 37 Río Petacalapa. Four kilometers northwest of Malacatan.
No. 38 Río Selegua. Five kilometers northwest of San Sebastian Huehuetanango.
No. 39 Río Blanco. Two kilometers west of Aguacatan.
No. 40 Río Negro. At Sacapulas.
No. 41 Río Uspantan. Eight kilometers west of San Miguel Uspantan.
No. 42 Río Chixoy. Twenty-two kilometers west of San Cristobal Verapaz.
No. 43 Río Rabinal. Five kilometers north of Rabinal.
No. 44 Río Rabinal. Two kilometers west of Rabinal.
No. 45 Río Salamá. At Salamá.
No. 46 Río San Jeronimo. At San Jerónimo.
No. 47 Río Carchela. Two kilometers north of Santa Rosa. Tributary of Rio Negro.
No. 48 Río Cahabon. One kilometer north of Coban.
No. 49 Río Cahabon. At San Pedro Carcha. Six kilometers northeast of Coban.
No. 50 Río Cahabon. At San Vicente Cahaboncillo. Four kilometers above mouth.
No. 51 Río Semui. South edge of Panzos.
No. 52 Río Tres Aguas. Four kilometers south of Panzos.
No. 53 Río Polochic. At Tamahu.
No. 54 Río Polochic. At Panzós.
No. 55 Río Polochic. Five kilometers above Lago Izabal.
No. 56 Río Dulce. Two kilometers above Livingston.
No. 57 Río Sarstun. At Cardenas.
No. 58 Río Motagua. Two kilometers north of Santo Tomas Chichicastanango.

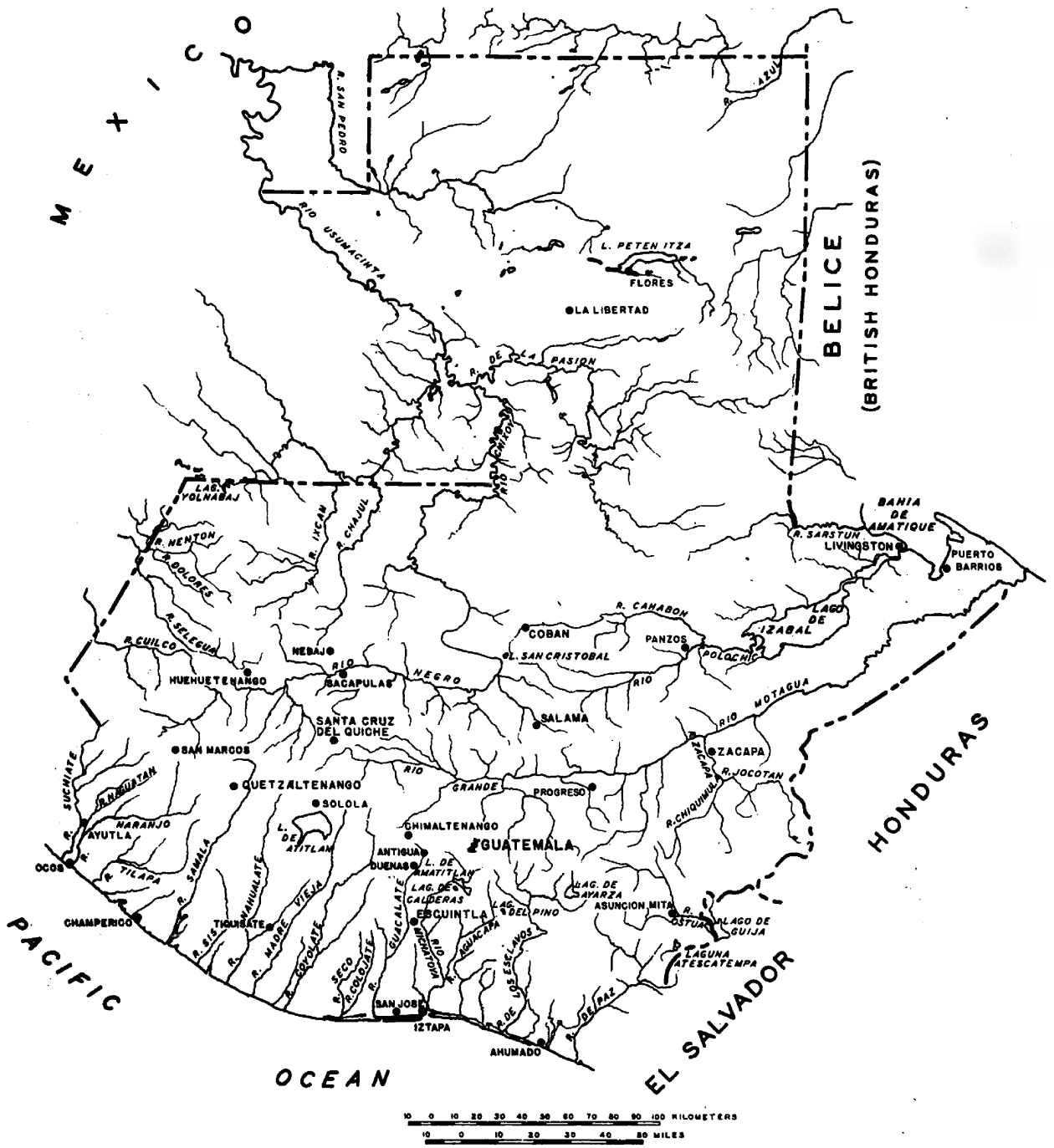
No. 59 Río Motagua. At Concua.
No. 60 Río Motagua. At Los Robles seven kilometers south of Gualan
No. 61 Río Motagua. At Gualan.
No. 62 Río Motagua. At Tenadores.
No. 63 Río Belejeya. Tributary of Río Motagua seven kilometers east of Concua.
No. 64 Río De Las Vacas. Two kilometers below San Antonio Las Flores.
No. 65 Río Purgatoria. At Agua Caliente. Tributary to Río Platanos.
No. 66 Río Platanos. Five kilometers southwest of Sanarate.
No. 67 Río Agua Caliente. At El Progreso.
No. 68 Río Morazan. Two kilometers south of Marajuma. Three kilometers above mouth.
No. 69 Río Morazan. At El Tablon. In headwaters.
No. 70 Río Tato. At San Agustin.
No. 71 Río Chimalapa. Near mouth at Cabanas.
No. 72 Río Riachenlo. At Teculutan. Departmento Zacapa.
No. 73 Río Viejo (Sunsapote). Five kilometers southwest of the town of Rio Hondo.
No. 74 Río Hondo. At Río Hondo.
No. 75 Río Zacapa. At Zacapa.
No. 76 Río Xutaque. At San Esteban. Six kilometers southeast of Chiquimula.



Map. No. 1 Río Dulce and El Golfete, Guatemala, Central America. Prepared by Ancil D. Holloway, 1947. Compiled chiefly from Chart No. 1937, River Dulce in Guatemala, Edition: 4th January, 1919. Hydrographic Office, U. S. Navy; also El Mapa Preliminar de Guatemala by Jefe Don Eduardo Goyzueta V. and Don Arturo de Leon C., Ministerio de Comunicaciones; and observations made by the present mission in May 1946 and May 1947.



Map No. 2 Lago De Izabal, Guatemala, Central America. Prepared by Ancil D. Holloway, 1947. Compiled from El Mapa Preliminar De Guatemala by Jefe Don Eduardo Goyzueta V. and Don Arturo De Leon C., Ministerio De Comunicaciones and from observations made by the mission in May 1946 and May 1947.



MAP NO. 3 - MAP OF GUATEMALA SHOWING PRINCIPAL STREAMS AND LAKES

Prepared by the United States Department of the Interior

GAME MAMMALS OF GUATEMALA

By

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Introduction

The following information concerns not only the game mammals of Guatemala, but all the large mammals, for without restraining rules, all species are legal game. An attempt will be made to point out which species are the most desirable game and which should be given protection. Insofar as possible, the information given was drawn from actual field observations in Guatemala.

Hunting in Guatemala

Guatemala is fortunate in having a large variety of wild game, much of which is abundant and of widespread distribution in the Republic. Perhaps as much as half of the country still retains at least a semblance of its original wilderness condition and in these wilderness areas, of course, is to be found the best and most varied hunting.

Wild or semiwild conditions prevail mainly in four general areas: Peten, the Caribbean lowlands, the mountains of Alta Vera Paz and northern Quiché, and the Pacific lowlands. It is difficult to say which of these areas is actually the best for all are good. Probably Petén would get the nomination, for it is by far the largest and least settled of the four. At the present time the Pacific lowlands, especially in the Department of Escuintla, are the most heavily hunted, both because they are near Guatemala City, and because they are easily accessible by good roads. The other areas too, however, which possibly offer even better hunting than the Pacific area, are not difficult to reach, though they do require the use of mules to reach some of the best sections. The Alta Vera Paz - Quiché area can be reached by road to either Cobán or Nebaj; regular airline schedules are maintained to Peten; and the Caribbean lowlands are accessible by a number of means, by road to Panzos, by rail from Guatemala City, or by boat from Panzós, Livingston, or Puerto Barrios.

The highlands offer the poorest hunting, and even before settlemen hundreds of years ago, probably could not equal the surrounding lowlands. Today the highlands are thickly settled, supporting a large portion of the population of the Republic, have been extensively cleared for farming except on some of the higher cerros, on the volcanoes, and in some of the deepest barrancas, and have been heavily hunted by the natives, many of whom are not able to raise enough corn on their farms to support their families. All these factors have worked almost to exterminate the game mammals in many parts of the highlands, and there appears to be little hope of restoration.

An attempt should be made to encourage hunters to utilize the other good hunting areas of the country, now largely neglected, so as to rest the Pacific lowland area and avoid the possibility of depleting its present sufficient game supply sometime in the future.

The large mammals of Guatemala, when considered on the basis of hunting, fall into three general groups, as follows (the total number of mammals, including both large and small, which occur in Guatemala is 159):

1. Large, generally hunted, species.

Raccoon
Coati
Kinkajow
Ring-tailed cat
Tayra
Grison
Coyote
Ocelot
Tiger cat
Puma
Yaguarondi
Jaguar
Agouti
Cavie
Collared peccary
White-lipped peccary
White-tailed deer
Brocket
Tapir
Armadillo (2 species)

2. Smaller, generally neglected, species.

Opossums (3 species)
Gray fox
Squirrels (6 species)
Rabbits (3 species)

3. Species which should be protected by law.

Otter	Three-toed anteater
Monkeys (3 species)	Great Anteater
Porcupine	Manatee

Without doubt, the most widely hunted game mammal of the Republic is the deer, hunted by sportsmen for the sport and by the Indians for the meat. The three big cats, jaguar, puma, and ocelot, likewise receive considerable attention. The other species listed as generally hunted are seldom hunted individually, but are often killed incidental to the hunt for the more favored game. It is doubtful that the quest for these less favored species could be much encouraged since they occur most abundantly in areas where the more favored species are also most abundant. If in the future the number of deer and big cats should be considerably reduced by hunting pressure, these others may become much more important than they are today. Most are lowland species or occur only sparingly in the highlands.

There are species which are common in many parts of the highlands, but they are almost completely overlooked by the sportsmen, who as a result find it necessary to travel down to the lowlands to enjoy their sport. These species are small, but when hunted with a small-bore rifle, a .22 caliber for instance, they offer as much test of skill as the larger game, even if not as much danger or thrill. These species are the opossums, squirrels, and rabbits. Besides offering good sport, they also reward the hunter with tasty meat, an attribute often lacking in the larger game species. Another mammal of the neglected category is the fox. It is almost everywhere abundant, and for the owner of hounds offers excellent sport in the chase.

A few species, because of their curious appearance, large size, and inability to make a rapid escape from danger, are ruthlessly killed by some hunters, merely for the sake of killing. While these animals are of no economic importance, they add color and interest to the forests, and an attempt should be made to save them so that later generations may have the pleasure of seeing them. The otter with its shiny fur and complete mastery of the water; the monkeys with their acrobatics and amusing antics; the procupine with its peculiar spiny coat; the anteaters with their amazingly long snouts; and the stolid manatee with its peculiar aquatic habits. Several have already grown scarce in Guatemala and have been completely exterminated in some sections. They have no value whatsoever as game, and should be given the protection of laws.

Catalog of Large Mammals of Guatemala

1.
Names.--Latin: Didelphis marsupialis
Guatemalan: Taquasing, Zorro
English: Central American Opossum

Description.--A large opossum, with general grayish coloration; long guard hairs extending beyond the short woolly underfur; naked black ears; pointed snout; and long, naked, scaly tail, black at the base, white toward the tip.
Distinguishing Characteristics.--No other Guatemalan mammal of similar size and coloration has a long naked tail, except Philander opossum (No. 2) which lacks the long guard hairs of the present species.
Measurements.--Three adults from Mazatenango and San Jose average: Total length, 821 mm.; tail, 425 mm.; hind foot, 61 mm.; ear, 58 mm.
General Distribution.--Central America and northern South America from Brazil and Peru north to Texas.
Distribution in Guatemala.--Common in all parts of the Republic, at least up to 6,000 ft. elevation, but rare or absent in heavy rain forests.
Habitat.--Scrubby and open woodlands, banana plantations, coffee fincas, thickets; often living close to human habitations.

Habits.--The opossum generally moves about only at night and divides its time between travel through the trees and on the ground. Its prehensile tail and grasping feet make it well adapted to movement in trees. It is omnivorous, eating whatever food may be most convenient, whether it be meat, insects, fish, fruit, frogs, or eggs. It sometimes steals chickens and eggs, and damages bananas in warehouses. It makes its den either in a hollow tree or in a hole in the ground, and rears five to ten young, often twice in a year. The young are carried by the female in a pouch on the belly.
Hunting.--The meat of the opossum is rather oily, but in many parts of its range is eaten by the natives. It is hunted at night with hounds, and shot from trees with the aid of a flashlight. In the southern United States, the opossum is considered by many sportsmen to be a good game animal. Apparently it is not hunted in Guatemala.
Remarks.--This species has also been known by the name Didelphis mesamericana.

2.
Names.--Latin: Philander opossum
Guatemalan: Comadreja
English: Pallid opossum

Description--Somewhat smaller than Didelphis marsupialis, but similar in general appearance, though lacking long guard hairs. Color of upper parts gray, underparts cream, head black except for conspicuous white spots above the eyes and on the cheeks; tail black at base, white at tip. Fur short and woolly.
Distinguishing characteristics.--To be confused only with Didelphis marsupialis (No. 1) from which it may be distinguished easily by the lack of guard hairs, which in Didelphis marsupialis extend conspicuously beyond the short fur.
Measurements.--Three adults from Lake Atescatempa and Mazatenango average: total length, 615 mm.; tail, 322 mm.; hind foot, 45 mm.; ear, 37mm.
General Distribution.--Vera Cruz, México south to Panama.
Distribution in Guatemala.--Lowlands and mountains up to at least 3,500 ft. elevation. Common.
Habitat.--Mostly along streams and in damp woods and thickets. Often found about banana, sugar, and corn storehouses.
Habits.--Like the other Guatemalan opossums it is nocturnal and partially arboreal, but because it seems to prefer damper situations, probably it eats a higher percentage of frogs, crabs, fish, and mice than the others. Two females trapped at Lake Atescatempa on April 20 had respectively five and seven small young in their belly pouches.
Hunting.-- See Didelphis marsupialis (No. 1)
Remarks.--Also known by the names Metachirops and Metachirus. The Guatemalan race is pallidus.

3.
Names.--Latin: Caluromys derbianus
Guatemalan: ?
English: White-eared woolly opossum

Description.--Slightly smaller than Didelphis marsupialis. Pelage thick and woolly, bright reddish on upper parts, cream-colored on underparts. Ears white, and a white stripe between the shoulders. Tail furred for one-half its length, the remainder naked and white.
Distinguishing characteristics.--The bright reddish coloration will distinguish it from any other Guatemalan mammal of similar size.
Measurements.--Average measurements are: total length, 635 mm.; tail, 375 mm.; hind foot, 35 mm.; ear, 35 mm.
General Distribution.--México south through Central America to Paraguay in South America.
Distribution in Guatemala.--Probably the tropical lowlands of the lower Río Motagua, around Lake Izabal, the Río Sarstun, and possibly parts of Petén. Uncommon.
Habitat.--Tropical lowland forests.
Habits.--The woolly opossum is probably seldom seen by man, being nocturnal and arboreal, living in the tops of forest trees. Its food probably consists mostly of fruits, insects, and birds' eggs.
Hunting.--See Didelphis marsupialis (No. 1)
Remarks.--The name Philander laniger has also been applied to this species. The Guatemalan race is fervidus.

4.
Names.--Latin: Procyon lotor
Guatemalan: Mapache, Mapachin
English: Raccoon

Description.--A chunky, short-legged carnivore, with a thick bushy tail which is ringed with brown and black; long brownish gray fur; and a black face mask extending from the nose and covering the eyes.
Distinguishing characteristics.--Chunkiness; black face mask; thick, bushy, ringed tail.
Measurements.--One adult from Mazatenango measured: total length, 970 mm.; tail, 320 mm.; hind foot, 120 mm.; ear, 55 mm.
General distribution.--North America from southern Canada to Panamá.
Distribution in Guatemala.--Common in all parts of the Republic.
Habitat.--Most numerous along streams, lakes, and marshes in wooded regions. Seldom found away from trees.
Habits.--The raccoon is somewhat arboreal, but finds most of its food on the ground or in the water. Fish, crabs, snakes, frogs, mice, and fruits are common foods. It usually nests in hollow trees, though occasionally crevices in rocks are used. Litters commonly contain four or five young.
Hunting.--Though not widely hunted in Guatemala, it is considered to be a fine game animal in the northern part of its range, where it is hunted at night with hounds. Its meat is rather palatable.
Remarks.--The species is represented in Guatemala by two geographic races: shufeldti in the Caribbean lowlands and Petén, dickeyi in the remainder of the Republic.

5.
Names:--Latin: Nasua narica
Guatemalan: Pizote, Pistole, Pisote
English: Coati

Description.--An animal similar in size to the raccoon but with a much longer, more slender, tapering tail, and long mobile snout. Fur is short and thick, hoary gray to brownish gray throughout, except on the throat, which is whitish, and on the face, which is covered with a black mask. The eyes are ringed with white.
Distinguishing characteristics.--Long tail, long snout, black face mask.
Measurements.--Two adults from San Jose measured: total length, 1160 mm.; tail, 522 mm.; hind foot, 97 mm.; ear, 36 mm.
General distribution.--Central America from México to northern Colombia.
Distribution in Guatemala.--In forested regions throughout the Republic. Common.
Habitat.--Most numerous in lowland rain forests and highland cloud forests, but occurring to some extent in drier forest types as well.
Habits.--Though mostly nocturnal, the coati is often seen in the early morning and evening. It usually travels in groups of three or four to ten or more individuals, and during excursions on the ground carries its tail erect. Its food consists largely of fruits, though it probably also eats quantities of insects and other animal matter. It rests during the heat of the day, usually in tree tops.
Hunting.--It is hunted with hounds at night or in the early morning, and is a good game animal. Often it runs on the ground for a long distance before taking to the trees, and then sometimes escapes the dogs by moving with agility from tree to tree. However, it frequently retreats immediately to the safety of a hole high in a tree. The meat is rather greasy.
Remarks.--Two races occur in Guatemala; yucatanica in Petén and the Caribbean lowlands and isthmica in the remainder of the country.

6.
Names.--Latin: Potos flavus
Guatemalan: Mico leon, Mico gringo (?)
English: Kinkajou

Description.--Somewhat smaller than the coati but similar in proportions except that the snout is rather short instead of elongated. Tail prehensile. Fur short and thick, straw-color throughout, except for black rings around the eyes.
Distinguishing characteristics.--Long, tapering, prehensile tail; yellowish brown coloration; short, rounded face.
Measurements.--Average measurements are: total length, 975 mm; tail, 500 mm.; hind foot, 95 mm.; ear, 40 mm.

General distribution.--Southern México south through Central America to Brasil.
Distribution in Guatemala.--Forested country from sea level to at least 5,500 ft. elevation. Both slopes.
Habitat.--Large forests, thus restricted more or less to the lowland rain forests and subtropical cloud forests in the uplands.
Habits.--A nocturnal, arboreal mammal living in large trees and seldom descending to the ground. It lives mostly on fruit and insects, and often several can be found together in a favorite fruit tree. They sleep during the day in thick foliage or in hollows in trees. Size of litters varies from two to four.
Hunting.--Because of their arboreal habits, they are not usually successfully hunted with hounds, but are often found at night with a light during hunts for other more desirable game animals.

7.
Names.--Latin: Jentinka sumichrasti
Guatemalan: Guayanoche
English: Ring-tailed cat

Description.--A slender, short-legged animal, with a fox-like face, relatively large ears, and a long bushy tail, ringed contrastingly with black and white. Coloration, gray brown.
Distinguishing characteristics.--Most likely to be confused with the fox (No. 11) but differing in the conspicuously ringed tail. The raccoon (No. 4) also has a ringed tail, but is a much stouter animal.
Measurements.--Two from Mazatenango averaged: total length, 900 mm.; tail, 500 mm.; hind foot, 75 mm.; ear, 45 mm.
General distribution.--Central America from western Panamá to eastern México.
Distribution in Guatemala.--In dense forests throughout the Republic, from sea level to at least 6,500 ft. elevation.
Habitat.--Forests of large trees.
Habits.--Because it is both nocturnal and arboreal, it is seldom seen, though often heard calling during the night. Its main foods are mice, birds, insects, and lesser amounts of fruits and other vegetable matter. Nests are usually in hollows in trees, and the number of young varies from two to four per litter.
Hunting.--These animals are not generally hunted, for their shyness, and nocturnal and arboreal habits make them difficult to discover. However, they are sometimes found during the pursuit of more desirable game.
Remarks.--Two races are represented in Guatemala: champechensis in Petén, and variabilis in the remainder of the country. It has also been known by the generic name Bassariscus.

8.
Names.--Latin: Lutra annectens
Guatemalan: Perro de aqua, Nutria
English: Otter

Description.--A heavy-set animal, with long, lithe body; short legs; heavy, thick, tapering tail; small ears; small eyes; and short, thick, lustrous, chocolate-brown fur.
Distinguishing characteristics.--Long body; thick, tapering tail; and dark, glossy brown fur.
Measurements.--Typical measurements are: total length, 910 mm.; tail, 378 mm.; hind foot, 131 mm.
General distribution.--Unknown; possibly México and Guatemala. Otters of this and other species occur in most parts of the Americas.
Distribution in Guatemala.--In most streams in forested country up to at least 5,000 feet elevation on both Caribbean and Pacific slopes. Probably most abundant in the foothills and upper edges of the coastal lowlands.
Habitat.--Rivers and streams in forests and swamps.
Habits.--The otter lives almost entirely in water, seldom venturing onto land, except to cross from one stream to another or to bask in the sun. It is an excellent swimmer and diver, and catches fish easily. Its other foods include frogs, crawfish, and other animals it can catch in the water. It builds its den in a hole in the river bank.
Hunting.--Hunters hunt the otter by sitting patiently beside a favorite pool, or by walking quietly along the banks of a stream or water course, taking the animal by surprise. It is not a good game animal despite its large size, and its meat is not usually considered to be suitable for eating. In the colder parts of its range, in Canada and in the United States, its fur has great value.

9.
Names.--Latin: Tayra barbara
Guatemalan: Perico lijero, Perrico lijero, Perito ligero, cabeza viejo
English: Tayra

Description.--Of the same size as the otter, but of slighter build. The body is long and lithe, and the tail is bushy. The legs are short and the ears small; the body and tail are black, while the head and neck are yellowish buff or grayish white.
Distinguishing characteristics.--No other Guatemalan mammal, large or small, has the characteristics of dark body and contrasting light-colored head.
Measurements.--An adult from Mazatenango measured: total length, 1095 mm.; tail, 440 mm.; hind foot, 110 mm.; ear, 20 mm.
General distribution.--Southern México, south through Central America to Paraguay, Bolivia, and Trinidad.
Distribution in Guatemala.--Lowlands of both slopes, from near sea level to at least 3,000 ft. elevation, possibly higher. Uncommon.
Habitat.--Forests.
Habits.--The tayra is a carnivorous animal, feeding mostly on birds and small mammals, and reputedly capable of capturing and killing animals even as large as deer. It is remarkably swift on the ground, and an agile climber in the trees. It is generally solitary.
Hunting.--The tayra is an excellent game mammal, but in most sections is probably not numerous enough to warrant special hunting. It will run for long distances before the hounds, sometimes making good its escape by taking to the trees and traveling for a considerable distance before returning to the ground, or sometimes by swimming across rivers.

10.
Names.--Latin: Grison canaster
Guatemalan: ?
English: Grison

Description.--In body size, almost as large as a tayra, but with a much shorter tail. Legs short and ears small. Upper parts are grizzled brown or gray; underparts and face black, with a white line extending across the forehead and along the edge of the black almost to the shoulders.
Distinguishing characteristics.--Stocky build, short tail, peculiar coloration; black below and gray above.
Measurements.--Typical measurements are: total length, 720 mm.; tail, 170 mm.; hind foot, 50 mm.; ear, 10 mm.
General distribution.--Southern México, south to Panamá.
Distribution in Guatemala.--The grison is rarely found in Guatemala, but undoubtedly occurs in the lowlands of both coasts and possibly also in the lower mountains where suitable forests occur.
Habitat.--Thick, humid forests.
Habits.--It is more or less nocturnal, and lives on a diet of birds, small mammals, and other kinds of animal life. Little else is known of its habits. Apparently it is a rare animal.
Hunting.--Despite its large size and elusiveness, it is of no value as a game animal because of its rarity.

11.
Names.--Latin: Urocyon cinereoargenteus
Guatemalan: Gato de Monte
English: Gray fox

Description.--A small, short-legged dog with pointed muzzle; erect pointed ears, bushy tail; blackish gray coloration on upper parts, and whitish or cinnamon coloration on under parts.
Distinguishing characteristics.--Dog-like face, pointed ears, bushy tail
Measurements.--Seven specimens from Escuintla, San Jose and Mazatenango averaged: total length, 863 mm.; tail, 355 mm.; hind foot, 117 mm.; ear, 64 mm.
General distribution.--Throughout the United States, México, and Central America to Panamá.
Distribution in Guatemala.--In all parts of the Republic from the sea coast to the tops of the volcanoes.
Habitat.--Prefers semi-open forest, but occurs also in deeper forest, thickets, brush lands, coffee fincas, and savannahs.
Habits.--While predominantly an animal of the night, the fox is often encountered during the daylight hours as well. It builds its den in burrows in the ground, in crevices among rocks,

or in hollow trees. The number of young per litter averages five. It is able to climb trees by jumping from limb to limb. The most favored foods are mice, rabbits, snakes, frogs, birds, berries, fruit, and corn.
Hunting.--The fox is not widely hunted in Guatemala, but is potentially one of the best game mammals. Without doubt, it is the most abundant of all the larger mammals of the Republic. Hunted at night, it runs well before the hounds and leads a merry chase before it is finally cornered in a tree. It is cunning enough to survive long after more favored game, such as deer, have disappeared from a region.
Remarks.--The species is represented by two geographic races in Guatemala: fraterculus in Peten, and guatemalae in the remainder of the country.

12.
Names.--Latin: Canis latrans
Guatemalan: Coyote
English: Coyote

Description.--A wild dog, similar in appearance to some varieties of the German police dog. Coloration of upper parts reddish gray, overlaid with black, under parts lighter. Pelage coarse and thin.
Distinguishing characteristics.--The coyote can be confused only with domestic dogs.
Measurements.--Average measurements are: total length, 1250 mm.; tail, 350 mm.; hind foot, 225 mm.
General distribution.--Alaska and Canada, south to Costa Rica.
Distribution in Guatemala.--Definitely recorded only from the high savannahs of the Sierra de los Cuchumatanes, but reported from many of the other more open portions of the highlands, and as low as 1,000 ft. elevation.
Habitat.--Savannahs, cleared land, and semiopen brush country.
Habits.--The coyote is well known for its attacks on sheep and poultry, and is usually considered to be one of the worst pests in the regions where it occurs. Its other foods consist of a variety of small mammals, predominately mice and rabbits, and birds. It lives in crevices in rocks or in burrows in the ground, and litters average four or five young. It hunts either singly or in pairs, either day or night. It is best known by its eerie howling at dusk and sunrise, and on moonlight nights.
Hunting.--In the northern parts of its range, it is hunted with high-powered rifles and shot at great distances. It is probably not abundant enough in Guatemala, except in the Cuchumatanes, and possibly other sheep raising sections, to be considered a game animal.

13.
Names.--Latin: Felis pardalis
Guatemalan: Tigrina
English: Ocelot

Description.--A large spotted cat, considerably smaller, however, than the Jaguar. The basic ground color of the body is yellowish orange or gray, and the whole body except the head and neck is covered with black rosettes in regular pattern. There are five parallel stripes of black on the back of the neck. The tail is rather short.
Distinguishing characteristics.--It is distinguished from the jaguar by smaller size and black stripes on the neck, and from the long tailed tiger cat (No. 14) by shorter tail.
Measurements.--An adult from Mazatenango measured: total length, 1125 mm.; tail, 334 mm.; hind foot, 170 mm.; ear, 55 mm.
General distribution.--Southern United States, south through Central America to Paraguay, in South America.
Distribution in Guatemala.--Apparently occurs in Guatemala wherever suitable forests exist.
Habitat.--Large forests, preferably rather damp, but occurs also in drier and more brushy situations.
Habits.--Hunting mostly at night, the ocelot lives on a diet of small mammals, ground birds, and such other animal food as it can capture. During the day, it sleeps in the leafy branches of trees or in thickets on the ground. Since it is of retiring habits, it usually does not bother stock or poultry.
Hunting.--Because of the value of its brightly colored skin as a trophy, the ocelot has received considerable attention as a game animal. It is hunted mostly at night with the aid of hounds, or shot at from boats along the coastal rivers and lagoons.

14.
Names.--Latin: Felis wiedii
Guatemalan:
English: Tiger cat

Description.--Like the ocelot (No. 13) in coloration and general appearance, but somewhat smaller, with a relatively longer tail.
Distinguishing characteristics.--Distinguished from the jaguar (No. 17) by the striped neck, and from the ocelot (No. 13) by longer tail.
Measurements.--Adults average: total length, 900 mm.; tail, 400 mm.; hind foot, 115 mm.; ear, 51 mm.
General distribution.--Southwestern México, south through Central America to Paraguay and northern Argentina, in South America.
Distribution in Guatemala.--Probably in the larger damper forests throughout the country, but recorded in recent years only in Alta Vera Paz and Petén. There are old records of its occurrence in the highlands. Apparently it has always been very rare.
Habitat.--Moist virgin forests, or large forests.
Habits.--Unknown, but probably similar to those of the ocelot.
Hunting.--Despite its close resemblance to the ocelot, which is a favorite game mammal, this species has no value whatever as game because of its rarity.
Remarks.--This species has also been called Margay glaucula, Felis tigrina, and Felis pirrensis. Geographic races represented in Guatemala are yucatanica in Petén, and salvinia in Vera Paz and the highlands.

15.
Names.--Latin: Felis concolor
Guatemalan: Puma, Leon
English: Puma

Description.--A large cat, nearly as large as the jaguar; with plain unspotted pelage, tan on the upper parts, and white below.
Distinguishing characteristics.--Large size, plain unspotted, tan coloration.
Measurements.--An adult from Peten measured: total length, 1710 mm.; tail, 660 mm.; hind foot, 240 mm.
General distribution.--Southern Canada, south through Central and South America to Patagonia.
Distribution in Guatemala.--Common in the lowland forests of both slopes and in the mountains of Alta Vera Paz and Quiche, and probably in other suitable places in the highlands as well.
Habitat.--Heavy forests.
Habits.--Like the other cats in most respects, hunting mostly at night, living an almost solitary life, climbing frequently into trees, denning in thickets and crevices among rocks, and preying upon mammals and birds. It is very powerful, and deer often make up a large portion of its diet. The number of young in its litters varies from one to five. Sometimes during the mating season it utters terrifying screams, but otherwise is quite silent.
Hunting.--Because of its large size and abundance, the puma is one of the favorite game mammals of Guatemala. It is hunted either at night with hounds, or from boats on esteros, or at baited spots in the forest.
Remarks.--The Guatemalan race is mayensis.

16.
Names.--Latin: Felis yaguarondi
Guatemalan: Onca, Leon miquero, "Gato monte"
English: Yaguaroundi

Description.--A medium size cat with long lean body, short legs, long tail, small rounded ears, and plain gray,, buff, reddish brown, or red coloration, lacking spots.
Distinguishing characteristics.--Small size, lack of spots, short legs.
Measurements.--Adults (including one from Mazatenango) average: total length, 1150 mm.; tail, 475 mm.; hind foot, 130 mm.; ear, 35 mm.
General distribution.--Southern Texas, south through Central America to Argentina.
Distribution in Guatemala.--Common in the drier parts of the Republic on both slopes, but probably most abundant in the Pacific lowlands. It is not likely that it occurs in the highlands above 5,000 ft. elevation.
Habitat.--Dense thickets and forests, most abundant in broken semi-open country.

Habits.--Apparently this cat moves about in the daytime more than its relatives, and is sometimes observed moving swiftly through the brush, or through the branches of trees as it is sometimes prone to do. Undoubtedly it feeds largely on mice, rats, and small birds.
Hunting.--This species is little hunted in Guatemala, but would make an excellent game animal. Not only does it move about during the daylight hours, but also lives in country well adapted to pursuit by dogs.
Remarks.--Has also been known by the names fossata, and eyra.

17.
Names.--Latin: Felis onca
Guatemalan: Tigre
English: Jaguar

Description.--A large, heavy, long-tailed cat, covered with black rosettes on the upper parts. The ground color is orange on the upper parts, white below.
Distinguishing characteristics.--Large size, spotted pattern, lack of stripes on neck.
Measurements.--Adults average: total length, 1,800 mm.; tail, 575 mm.; hind foot, 220 mm.
General distribution.--Southern United States, south through Central America to Patagonia.
Distribution in Guatemala.--Lowlands of both coasts, Petén, and the mountains of Alta Vera Paz and Quiché.
Habitat.--Heavy, moist forests.
Habits.--The jaguar is the most powerful beast of prey in Central America. It has no natural enemies, except perhaps the crocodile. However, despite its formidable size and reputed ferocity, it seldom attacks a man without ample provocation. Though it hunts mostly at night, it is frequently seen along jungle roads and trails during the daylight hours. It spends most of its time on the ground where it captures a variety of mammals and birds, but frequently takes to trees, especially when closely pursued by dogs. Also, it occasionally uses the lower branches of trees as a resting place. Three is the average number of young per litter. A black color phase sometimes occurs anywhere within the range of the species. Black cats have been reported at San Jose, on the Pacific coast.
Hunting.--The jaguar rightfully holds the position of king of game mammals in Central America. Large size and beautiful pelt make it a fine trophy, and the potential danger of the hunt for such a powerful beast adds zest to the hunting. In Guatemala, excellent hunting may still be obtained in the Pacific lowland forests and in Petén. The most successful hunting methods are pursuit with hounds during the day, and use of boats along esteros at night.
Remarks.--Geographic races represented in Guatemala are goldmani in Peten, and centralis in the other parts of the country.

18.
Names.--Latin: Alouatta palliata
Guatemalan: Mono negro, Mono
English: Howler monkey

Description.--A large, heavy monkey, with long, prehensile tail; rather short legs, a naked black face, a beard (in the male) and long black hair.
Distinguishing characteristics.--Large size; uniform black coloration.
Measurements.--Adults average: total length, 1,000 mm.; tail, 500 mm.; hind foot, 175 mm.; ear, 30 mm.; weight, 25 lbs. (male), 15 lbs. (female).
General distribution.--Southern Vera Cruz, México, south through Central America to Ecuador.
Distribution in Guatemala.--Lowlands of both coasts, Petén, and the mountains of Alta Vera Paz and Quiché.
Habitat.--Tall trees in dense forests.
Habits.--Howlers are best known for their voices, their roars and growls reverberating through the forest in the early morning and late evening, and sometimes even during the hot hours of the day. They travel in groups containing up to twenty individuals, but ten is a more usual number. Each group roams over a rather limited area, and movement in a day's time may cover only a short distance. They breed at all times of the year, and the family groups usually contain young of all ages. At first the young clings to its mother's belly as the group moves about, but later, when it grows larger, it rides on her back. The food of howlers consists mainly of tree leaves and buds, with a supplementary diet of fruit. They have few natural enemies.
Hunting.--The monkeys can hardly be considered game mammals, but they fall under this classification by virtue of the fact that they are used for food in some sections. Oddly enough, in some other areas they are shunned by the natives. The howler seems to have been almost

exterminated in the Pacific coast lowland forests of Guatemala, either by overhunting or disease. Along the Río Polochic, between 1910 and 1915, almost the whole population, human as well as monkey, was wiped out by yellow fever. By the early 1930's recovery was almost complete, and monkeys are now very abundant in this region.
Remarks.--The species is represented in Guatemala by the following races: In Petén, pigra; in the Caribbean lowlands, villosa; along the Pacific coast, palliata; in the mountains of Quiché and Alta Vera Paz, an undetermined race.

19.
Names.--Latin: Cebus capucinus
Guatemalan: Mico capuchino
English: Capuchin monkey

Description.--A medium sized monkey with long, hairy tail, relatively short limbs, and short fur. Coloration white on the face, chest and shoulders and black on the remainder of the body.
Distinguishing characteristics.--Medium size, white face contrasting with black of body.
Measurements.--Average measurements are: total length, 880 mm.; tail, 480 mm.; hind foot, 130 mm.; ear, 35 mm.
General distribution.--Belize, south through Central America to northern South America.
Distribution in Guatemala.--No specimens have ever been taken in the Republic, but it has been reported from the Lake Izabal district, and should occur as well in the heavy forests along the lower parts of the Ríos Sarstun, Polochic, and Motagua.
Habitat.--Heavy forests.
Habits.--Similar to those of the howler, but less fortunate in vocal ability. Fruits are its main items of food, supplemented with insects, birds' eggs and young birds.
Hunting.--See Alouatta palliata (No. 18).
Remarks.--The race in Guatemala is probably limitator.

20.
Names.--Latin: Ateles geoffroyi
Guatemalan: Mico.
English: Spider monkey

Description.--A large, slender monkey with a long prehensile tail; long slender limbs; no thumb on forefeet; thin stringy hair; coloration brownish black above, and whitish below.
Distinguishing characteristics.--Very long limbs and tail; only four digits on forefeet.
Measurements.--Average measurements are: total length, 1,150 mm.; tail 700 mm.; hind foot, 160 mm.; ear, 20 mm.; weight, 18 lb. (male), 16 lb. (female).
General distribution.--Southern México, south through Central America to northern Colombia.
Distribution in Guatemala.--Formerly occurred throughout the more humid forest regions, including the highlands, where it was recorded on several of the volcanoes. Now found only in Petén, in the lowland forests of both coasts and in the mountains of Quiché and Alta Vera Paz.
Habitat.--Large forests.
Habits.--The spider monkey is the most arboreal species present in Guatemala, and is one of the most agile climbers on this continent. It travels entirely through the tree tops, sometimes making considerable speed. It uses its tail effectively as a fifth hand and often hangs by it while reaching for fruits, its main item of food. It is adept at making long leaps from tree to tree, or from one part of a tree to another.
Hunting.--See Alouatta palliata (No. 18).
Remarks.--The following geographic races occur in Guatemala: yucatanensis in Petén, pan in the mountains of Quiché and Alta Vera Paz, and vellerosus in the lowland forests on both coasts.

21.
Names.--Latin: Sciurus deppei
Guatemalan: Ardilla
English: Deppe squirrel

Description.--A small squirrel with relatively short tail, reddish brown coloration on the upper parts, and whitish on the underparts.
Distinguishing characteristics.--Small size; uniform reddish color of upper parts.
Measurements.--Guatemalan specimens from a dozen scattered localities average: total length, 382 mm.; tail, 162 mm.; hind foot, 55 mm.; ear, 18 mm.

General distribution.-- Vera Cruz, México, south to Nicaragua.
Distribution in Guatemala.--Virtually the whole Republic, from sea level to at least 10,000 feet on the volcanoes. It is, however, rather local in its distribution and may be rare or absent in wide areas while abundant in others.
Habitat.--Deep lowland jungles, damp riverbank thickets, dry mountain forests, coffee fincas, mountain cloud forests, and semi-cleared land.
Habits.--The habits of all the squirrels of Guatemala are more or less similar and will be stated only for Sciurus deppei which will serve as an example. All the Guatemalan species are more or less arboreal, descending to the ground only in search of food. Main items of their diet are nuts, pine seeds and seeds of other varieties, tree buds, insects, and occasionally fruits. Nests are built either in hollow tree trunks or in balls of leaves constructed in the branches of trees. Breeding probably is year round in Central America, and the number of young per litter ranges from two to six or eight. Squirrels are very agile, and travel with ease and rapidity through the tree tops, often making remarkably long leaps from one tree to another. They have many natural enemies, among the worst of which are hawks. They move about only during the daytime.
Hunting.--This is the smallest species of squirrel occurring in Guatemala, and in that respect is less desirable as a game mammal than the others. However, it has a wide range and in many areas is the only squirrel represented, thus filling an important place on the list of game mammals. In some parts of the highlands it is almost the only game mammal.
Remarks.--Guatemala is within the range of two races of this species, vivax in Petén, and deppei in the remainder of the Republic.

22.
Names.--Latin: Sciurus aureogaster
Guatemalan: Ardilla
English: Fire-bellied squirrel

Description.--A large squirrel with bright red belly, the red extending up over the shoulders, forming a band across the back; the remainder of the back and head, gray; feet, black; and tail, blackish.
Distinguishing characteristics.--Large size; red under parts and red band across shoulders; and general dark coloration.
Measurements.--Typical measurements are: total length, 523 mm.; tail, 267 mm.; hind foot, 67 mm.
General distribution.--Central México, south to northwest Guatemala.
Distribution in Guatemala.--Extreme northwest part of Petén.
Habitat.--Humid tropical forests.
Habits.--See Sciurus deppei (No. 21).
Hunting.--As Guatemala is at the southern extremity of the range of the species, it is undoubtedly uncommon and of no importance as a game mammal. Guatemala has no less than six species of large squirrels within its boundaries, yet they are almost completely neglected as game and food animals. Potentially, they are among the most important of all. They withstand much more hunting than the larger game, are far more abundant, live in more kinds of habitat, and are more likely to survive changes in habitat, such as clearing and destruction of forests. Their meat is delicious and wholesome, and two or three squirrels make a good meal for the average family. Lastly, it is a fine sporting species and it takes considerable hunting skill to make a large kill. Not only is stealth required but also shooting accuracy, especially if a small calibre rifle is used. As a rule, a squirrel will not sit still long enough to allow an easy shot, and will absorb a surprisingly large number of rifle shots unless they are well placed.
Remarks.--The Guatemalan race is hypopyrrhus.

23.
Names.--Latin: Sciurus socialis
Guatemalan: Ardilla
English: Tehuantepec squirrel

Description.--A large gray squirrel with red under parts, gray feet, and a red patch on the top of the head, including the ears, back of the neck and eyes.
Distinguishing characteristics.--Large size; red patch on top of head.
Measurements.--Average measurements are: total length, 524 mm.; tail, 224 mm.; hind foot, 67 mm.
General distribution.--Pacific slope from Guerrero, México, south to northwest Guatemala (Nenton).

Distribution in Guatemala.--Known only from Nenton, in the upper valley of the Río Chiapas.
Habitat.--Low, scrubby forest.
Habits.--See Sciurus deppei (No. 21).
Hunting.--This species has too small a range in Guatemala and is too rare to be of importance as a game mammal.
Remarks.--The Guatemalan race is socialis.

24.
Names.--Latin: Sciurus griseoflavus
Guatemalan: Ardilla
English: Guatemala squirrel

Description --A large squirrel, with uniform gray or grayish brown upper parts, and reddish under parts.
Distinguishing characteristics.--Large size; uniform coloration of upper parts, lacking red patches.
Measurements.--Five specimens from the Guatemalan highlands averaged: total length, 524 mm.; tail, 254 mm.; hind foot, 68 mm.; ear, 24 mm.
General distribution.--Highlands of Chiapas and Guatemala.
Distribution in Guatemala.--In the highlands above 3,500 feet elevation, and to timber line on the volcanos. Abundant.
Habitat.--Dry forests of oak and pine, arid scrub forests, and moist cloud forests.
Habits.--See Sciurus deppei (No. 21).
Hunting.--This is one of the most important game squirrels of the Republic. Not only is it the largest of the squirrels, but it is a highland species, occurring in many areas where other game is scarce.
Remarks.--Guatemalan races are: chiapensis in Huehuetenango and south to Cerro Calel; and griseoflavus in the remainder of the highlands, southeast to Antigua at least.

25.
Name.--Latin: Sciurus yucatanensis
Guatemalan: Ardilla
English: Yucatan squirrel

Description.--A medium size squirrel, grayish or brownish on upper parts and gray or grayish white on under parts. The feet are often black, and occasionally other parts of the body.
Distinguishing characteristics.--Medium size, grayish coloration, lack of red on any part of the body.
Measurements.--Five adult specimens from Alta Vera Paz averaged: total length, 490 mm.; tail,247 mm.; hind foot, 60 mm.; ear, 20 mm.
General distribution.--Southeastern México south to northern and eastern Guatemala.
Distribution in Guatemala.--Petén, eawtern Alta Vera Paz and the Lake Izabal district, also possibly the lower Río Motagua. Apparently local in distribution, being absent from many seemingly suitable localities.
Habitat.--Humid tropical forests.
Habits.--See Sciurus deppei (No. 21)
Hunting. --The Yucatan squirrel is important because it is the only game squirrel in the northeastern part of the country except the smaller Sciurus deppei. However, since it occurs in a region where large game of all kinds is abundant it is not likely that it will even be utilized to any extent as a game mammal. This is unfortunate for it has better sporting qualities than most of the other squirrels. It is shy and retiring, and to make a good kill requires skillful and arduous hunting even in regions where it is abundant.
Remarks.--Guatemalan races are baliolus in Peten, phaeopus in Alta Vera Paz and southeastwards.

26.
Names.--Latin: Sciurus variegatoides
Guatemalan: Ardilla
English: Variegated squirrel

Description.--A rather large, long tailed squirrel, very variable in coloration. Upper parts vary from buffy, reddish, orangish and grayish to blackish, while the underparts may be white, red, or gray. There is always a conspicuous light colored spot behind the ear, either white, buffy or reddish.
Distinguishing characteristics.--Long tail, light patches at bases of ears.

Measurements.--Five adults from Mazatenango averaged: total length, 530 mm.; tail, 278 mm.; hind foot, 66 mm.; ear, 27 mm.
General distribution.--Southern Guatemala and Chiapas south to Colombia.
Distribution in Guatemala.--Pacific coastal plain and lower mountain slopes, highlands along the Salvadorean and Hondurean borders, and in the Caribbean lowlands north to the Rio Motagua. Everywhere abundant.
Habitat.--Tropical forests, coffee fincas, banana plantations, dry oak woodlands, and semi-cleared lands.
Habits.--A nest of very young squirrels, probably of this species, was found in a hollow tree at San Jose on April 3. Probably it breeds at all times of the year. For other habits see Sciurus deppei (No. 21).
Hunting.--This squirrel is one of the most abundant game mammals on the Pacific coast and it is not at all difficult to make a good killing of them.
Remarks.--There are five races within the limited range of the species in Guatemala: goldmani along the western part of the Pacific coast, bangsi along the eastern part of the Pacific coast, variegatoides in the highlands along the borders of El Salvador and Honduras, boothiae along the border of Honduras on the Caribbean coast, and managuensis in the tropical portion of the Río Motagua valley.

27.
Names.--Latin: Coendou mexicanum
Guatemalan: Puerco espino, Puerco espin
English: Tree porcupine

Description.--A chubby, heavy set animal with prehensile tail, and body covered with long sharp spines. General coloration blackish or grayish black.
Distinguishing characteristics.--Long sharp spines.
Measurements.--Adults average: total length, 725 mm.; tail, 250 mm.; hind foot, 60 mm.
General distribution.--Mountains of México and Guatemala, south through Central America to Chile in South America.
Distribution in Guatemala.--Highlands above 2,000 feet elevation. Uncommon.
Habitat.--Forests, usually moist.
Habits.--The habits of this porcupine are little known. However, it is known to be nocturnal and to spend most of its time in tree tops where it lives on a diet of buds, leaves, possibly tree bark and probably some fruit. Its spines are a defense against its natural enemies.
Hunting.--This is not a good game mammal and because it is scarce and an interesting curosity of nature it should not be molested. It is a slow moving beast and despite its spines has no defense against firearms or clubs. They are generally killed as a trophy whenever discovered.
Remarks.--The Guatemalan race is mexicanum.

28.
Names.--Latin: Dasyprocta punctata
Guatemalan: Cotuza
English: Agouti

Description.--A large pig sized rodent with rather short legs, feet with hoof-like nails, a rabbit-like face, almost no tail, long coarse hair, and dark yellowish brown coloration.
Distinguishing characteristics.--Large size, dark brown unspotted pelage.
Measurements.--Adults average: total length, 550 mm.; tail, 25 mm.; hind foot, 115 mm.; ear, 36 mm.
General distribution.--Southern México south through Central America to Bolivia and Paraguay.
Distribution in Guatemala.--Probably the whole Republic, but seemingly more abundant on the Caribbean side.
Habitat.--Savannahs, brush land, scrub forest and rain forest.
Habits.--This large rodent, though chiefly nocturnal, is often discovered during daylight hours and in the early morning and evening twilight. It lives in burrows in the ground and litters generally consist of two young. Its main foods are fruit, berries, leaves and buds.
Hunting.--The cotuza is a fine game mammal and it is often hunted by the Indians for its meat. It is of shy disposition and usually not more than a fleeting glimpse is obtained of it when it is surprised in the woods. It is sometimes hunted successfully with hounds. Possibly a better method of hunting is to sit quietly in an area known to be inhabited by cotuzas and wait for them to appear.
Remarks.--Probably three races are represented in Guatemala, chiapensis in the highlands, yucatanica, in Petén, and punctata on the Pacific and Caribbean coasts.

29.
Names.--Latin: Cuniculus paca
Guatemalan: Tepeizcuinte, Gibmot
English: Cavie, paca

Description.--A large rodent, somewhat similar to Dasyprocta (No. 28), but with shorter legs and very different coloration. Reddish, with longitudinal rows of conspicuous white spots and stripes on the sides from the neck to the tail, which is very short.
Distinguishing characteristics.--Large size; reddish coloration; white spots and stripes on sides.
Measurements.--Adults average: total length 700 mm.; tail, 20 mm.; hind foot, 100 mm.; ear, 25 mm.
General distribution.--México to Brazil, Paraguay, and Peru.
Distribution in Guatemala.--Probably the whole Republic, but definitely reported only from the highlands, where it is common on the volcanoes, from Petén, and from near Tiquisate in the Pacific lowlands.
Habitat.--Forests and brush lands, often in rocky areas.
Habits.--This species is even more nocturnal than the cotuza, and therefore less likely to be observed during the daytime. It inhabits burrows in the grounds, often in rocky places, where the natural recesses among the rocks may be utilized to some extent. Like the cotuza, it subsists on a vegetable diet.
Hunting.--The most of this species is delicious, and often may be found for sale in the Indian markets. Next to deer, this animal is presently the most important wild species from the standpoint of the Indian. Also, when hunted with hounds, it often displays good sporting characteristics, though it is sometimes too quick to retreat to its burrow, where it remains quite safe unless more than one dog goes in after it.
Remarks.--The Guatemalan race is probably nelsoni.

30.
Names.--Latin: Lepus flavigularis
Guatemalan: Liebre
English: Jack rabbit

Description.--A large hare with long prominent ears; hind legs much larger than the forelegs; short, powderpuff tail. Coloration as follows: upper parts buff washed with black; forelegs and throat plain buff; hind legs gray; and under parts white.
Distinguishing characteristics.--Large size; long hind legs and ears; varied color pattern.
Measurements.--Measurements of adults average: total length, 595 mm.; tail, 77 mm.; hind foot, 133 mm.; ear, 112 mm.
General distribution.--Coastal plains and foothills from the southern end of the Isthmus of Tehuantepec in Oaxaca, México, to near the Guatemalan border in Chiapas. Sea level to 2,000 feet elevation.
Distribution in Guatemala.--This species has never been recorded in Guatemala, but might be expected in the Pacific lowlands near the Mexican border.
Habitat.--Dry savannahs, pasture land, and open brush land.
Habits.--Jack rabbits are noted mainly for the speed and long jumps which they employ in escaping from danger. Like other rabbits and hares, they hop instead of walk, using their large hind legs in kangaroo fashion. They live in clumps of grass and probably also use burrows in the ground as retreats. They are vegetarians, and subsist mainly on the foliage of plants.
Hunting.--Like the coyote, which occurs in similar habitat, the jack rabbit is at its best as a game animal when it can be shot at long distances with a small rifle. In the southern part of the range of this particular species, however, the terrain does not offer that opportunity, and it is hunted by the same methods as the smaller rabbits.

31.
Names.--Latin: Sylvilagus floridanus
Guatemalan: Conejo
English: Cottontail rabbit

Description.--A medium size rabbit with relatively long hind legs and ears, and a short, fluffy, cotton-like tail. Coloration gray brown on the upper parts, and white below, with a reddish patch on the nape.
Distinguishing characteristics.--Long ears; fluffy, cotton-white, powder-puff tail.

Measurements.--Guatemalan specimens average: total length, 425 mm.; tail, 50 mm.; hind foot, 96 mm.; ear, 65 mm.
General distribution.--Southern Canada, south to northwestern Costa Rica.
Distribution in Guatemala.--Pacific coastal plain and central highlands from sea level to 10,000 feet elevation. Not known to occur in Peten or the Caribbean lowlands, though a specimen has been taken near Zacapa.
Habitat.--Brush lands, savannahs, open farm country, and both dry and somewhat moist woodlands.
Habits.--The habits of the cottontail are not unlike those of the jack rabbit (No. 30).
Hunting.--From the standpoint of sport, this is the most important rabbit occurring in Guatemala; yet, unfortunately, it is hardly noticed by hunters. It has excellent sporting qualities, lying in concealment until the hunter is near, then bounding away in an amazing burst of speed, presenting a fine target for the small bore rifle. Also, it can be hunted with hounds. Its meat is delicious and is utilized to a considerable extent by Indians. Rabbits are often common in regions where more desirable larger game is scarce or absent. This is particularly true of many parts of the highlands. Thus, this animal holds an important place on Guatemala's list of neglected game mammals.
Remarks.--Guatemalan races are: aztecus in the Pacific lowlands and up to 2,000 feet, chiapensis in the highlands from 2,000 feet to 10,000 feet, and in the Caribbean lowlands down to 700 feet elevation.

32.
Names.--Latin: Sylvilagus gabbi
Guatemalan: Conejo
English: Forest rabbit

Description.--A small rabbit, with typically long ears and long hind legs, no visible tail, and very dark coloration: buffy burnished with reddish black on the upper parts and white on the under parts.
Distinguishing characteristics.--Long ears, dark coloration, and absence of visible tail.
Measurements.--One from San Jose measured: total length, 395 mm.; hind foot, 80 mm.; ear, 51 mm.
General distribution.--Vera Cruz and Oaxaca, south to Panamá.
Distribution in Guatemala.--Lowlands of both coasts, and up to 5,000 feet elevation.
Habitat.--Humid tropical forests and heavily forested mountain slopes; heavy undergrowth.
Habits.--Similar to those of the other rabbits.
Hunting.--Since it occurs in areas where larger game is generally abundant, it is of no great importance as a game mammal.
Remarks.--The Guatemalan race is truei.

33.
Names.--Latin: Tayassu tajacu
Guatemalan: Coche de monte
English: Collared peccary

Description.--A short legged, robust, pig-like mammal with long tusks, hoofed feet, short ears, short tail, coarse hair, and general grayish coloration, with a lighter colored collar completely encircling the neck.
Distinguishing characteristics.--Pig-like form; gray coloration with whitish collar.
Measurements.--Adults average: total length, 890 mm.; hind foot, 190 mm.; weight, 50 lb.
General distribution.--Southern Texas and México, south through Central America to Patagonia.
Distribution in Guatemala.--Lowlands of both coasts, Petén, and in the highlands up to 6,000 feet elevation. Common.
Habitat.--Forests and brush lands.
Habits.--Peccaries resemble domestic swine in many respects. They feed on a great variety of vegetable and animal food; root in the ground in search of food, leaving characteristic patches of uprooted earth; make grunting and squealing sounds; and travel in packs. They are said to be ferocious and dangerous when wounded, and often the whole pack comes to the aid of the wounded member. Normally, however, they are shy and timid and make off rapidly at the approach of humans. Often the young are captured and kept as pets by the natives. Half-grown young were observed near San José in late March and early April.
Hunting.--The peccaries are amoung the best of the Guatemalan game mammals. They have many good sporting qualities. They are of large size, they are wary, not usually offering easy shots, they are dangerous when wounded, and give a good chase when pursued by hounds. There should be a restriction against the shooting of young or females accompanied by young in order to preserve the abundance of the species.

Remarks.--There are three geographic races in Guatemala: yucatanensis in Petén, nigrescens on the Caribbean slope, and nelsoni on the Pacific slope.

34.
Names.--Latin: Tayassu pecari
Guatemalan: Coche de Monte, Warree, Puerco de Monte
English: White-lipped peccary

Description.--A pig-like mammal, somewhat larger than Tayassu tajacu (No. 33), dark reddish black in coloration and with a conspicuous white area around the mouth and on the chin.
Distinguishing characteristics.--Large size; dark coloration; white "lips."
Measurements.--Adults average: total length, 1,180 mm.; hind foot, 230 mm.; weight, 75 pounds.
General distribution.--Southern México, south through Central America to Paraguay.
Distribution in Guatemala.--Tropical lowlands of both coasts and Petén. Less common than No. 33, except in Petén.
Habitat.--Lowland forests.
Habits.--Similar to those of the collared peccary (No. 33). Both species move about a great deal during the daytime, and can sometimes be observed by a person who sits quietly in the woods watching for game.
Hunting.--This species travels in larger packs than does the collared peccary, and is reported to be more vicious and dangerous when molested. If danger in hunting increases the desirability of a mammal as a game animal, then this species is the better of the two peccaries which occur in Guatemala.
Remarks.--The Guatemalan race is ringens.

35.
Names.--Latin: Odocoileus virginianus
Guatemalan: Venado
English: White-tailed deer

Description.--A large deer, with relatively long legs, a rather large tail, dark above and white below; with fairly large antlers which usually branch out with seldom more than two prongs to an antler; and with coloration on upper parts reddish brown, and on under parts white.
Distinguishing characteristics.--Large size; relatively large branching antlers; large tail; and light under parts.
Measurements.--An adult from Escuintla measured: total length, 1,320 mm.; tail, 210 mm.; hind foot, 455 mm.; ear, 125 mm.; height at shoulder, 790 mm.
General distribution.--Canada, south through the United States and Central America to northern South America.
Distribution in Guatemala.--Common in most parts of the Republic, both in the lowlands and in the mountains, but conspicuously absent from some areas in the highlands.
Habitat.--Lowland rain forests, brush lands, savannahs, semicleared farmland, mountain cloud forest, and dry oak woods.
Habits.--The deer is a grazing mammal which feeds mainly on grasses, succulent herbs and leaves, and buds of trees and shrubs. It is abroad mainly at night, but is sometimes found accidently during the day. Generally it spends the day bedded down in thickets, in the deep forest, or in tall grass. It is shy and timid, and attempts to slip away unseen when approached by humans. When it is discovered, it bounds away in long leaps, flashing its white tail like a danger flag. The males have bony antlers which are shed once a year, while the females have none. The females bear young once a year, varying in number from one to four, but usually two. It is not certain whether there is a definite breeding season in Guatemala. Two small young, which did not appear to be more than two weeks old, were seen near San Jose in late March, while others seen were probably about six months old. A female with two small young was seen on the shore of Lake Izabal in early May. The natural enemies of deer are mainly the big cats, though the small young are in danger from a host of other smaller predators, including some of the hawks.
Hunting.--The deer is by far the most important of Guatemala's multitude of game mammals and birds. As far as most hunters of the Republic are concerned the deer is the primary game mammal, and everything else that is killed is incidental to the deer hunt. One of the popular means of hunting is by driving. In this method, the hunters take stands along favorite deer runs, and hounds are employed to drive the deer toward the hunters. Other methods include following the hounds, or not using hounds at all, and merely walking quietly through territory known to be inhabited by deer. The deplorable practice of shooting deer at night with

the aid of a light should be outlawed. Also, it would be advisable to make it illegal to kill females or young. The deer is still abundant in many parts of the Republic, but not so abundant that it should not be afforded some protection. Besides its value as a sporting animal, it is also an important item in the food of the Indians throughout the country. In many cases it is almost their only source of meat. In remote districts, where ammunition is scarce, one shot at a deer will furnish so much meat that the Indians are generally reluctant to waste shots on smaller though equally palatable game.
Remarks.--The Guatemalan race is thomasi.

36.
Names.--Latin: Mazama sartorii
Guatemalan: Guitsizil, Gyisizil, Cabro, Cabra de Monte
English: Brocket

Description.--A small deer, with heavy body, rather short slender legs, antlers reduced to short straight spikes no more than a few inches long, and with uniform bright reddish coloration only slightly paler on the under parts.
Distinguishing characteristics.--Small size; heavy body; uniform reddish coloration, and short spike antlers.
Measurements.--Adults average: length of head and body, 950 mm.; hind foot, 250 mm.
General distribution.--Vera Cruz, México, south to Paraguay.
Distribution in Guatemala.--Probably the whole Republic from sea level to 10,000 feet on the volcanoes, but apparently most abundant at the higher elevations. It is known also for Peten, Alta Vera Paz, and Quiché, and is reported from the Pacific coast region. Except at higher elevations and in the Zona Reina region, it is less common than the larger deer.
Habitat.--Prefers deeper forests and denser thickets than the common deer.
Habits.--Similar to the deer (No. 36), but more shy and secretive.
Hunting.--See No. 36. Because of its smaller size and general scarcity, this species does not approach the deer in importance as a game mammal.
Remarks.--The Guatemalan race is cerasina.

37.
Names.--Latin: Tapirella bairdii
Guatemalan: Danta
English: Tapir

Description.--A large, stocky, stout-legged beast, with long flexible snout, short tail, short ears, hoofed feet, and scanty blackish brown hair.
Distinguishing characteristics.--Large size; long, mobile nose; hoofed feet.
Measurements.--Typical measurements are: total length, 2,020 mm.; tail, 70 mm.; hind foot, 575 mm.; ear, 140 mm.
General distribution.--Vera Cruz, México, south to Panamá.
Distribution in Guatemala.--Caribbean and Pacific lowlands, Petén, and the mountains of Quiché and Alta Vera Paz.
Habitat.--In the lowlands: swamps, marshes, and river banks; in the mountains; moist cloud forests.
Habits.--The tapir is nocturnal, extremely shy and secretive, and is very seldom seen by humans. Generally its presence is known only by its tracks or by the loud grunting or roaring sounds which it sometimes utters at night. It is a vegetarian and subsists mainly on buds, leaves, shoots, and grasses. It is a solitary mammal, and seldom found in company, except in the case of female with young.
Hunting.--This, the largest of Guatemalan land mammals, is seldom hunted in the Republic, largely because of the difficulties involved. In the first place, despite its large range, it has a very limited distribution, being practically restricted to the larger lowland swamps. Even within this limited distribution, it is generally scarce and travels alone, never banding into groups. Thus, it is very difficult to find, even in an area known to be inhabited. Its extreme shyness and the swampy habitat make it even more difficult to find. There are only two practical means of hunting the tapir and neither is very effective. The first method is with dogs, and since the tapir immediately retreats to the water, often infested with crocodiles, the loss of dogs is sometimes great. The other method is to cruise along the river banks at night in a boat. Of course, bagging a tapir by this method is pure luck. When wounded, the generally inoffensive tapir may become very dangerous, even as much so as the big cats. For the hunter who prefers hunting which is difficult and dangerous, and requires extra skill, the tapir is a fine game mammal. Also, while hunting in these wildest parts of the Republic, he is sure to get a wide variety of other game as well.

38.
Names.--Latin: Tamandua tetradactyla
Guatemalan: so colmenera
English: Three-toed anteater

Description.--A large mammal with long, conical snout; long, tapering, prehensile tail; long, curved claws; close coarse pelage; and a contrasting color pattern of black and cream. The general body color is cream or yellowish, with black patches around the eyes, and with the black of the belly extending up the sides, across the shoulders, and meeting across the lower back.
Distinguishing characteristics.--Large size; long snout; long, curved claws; black and cream coloration.
Measurements.--Adults average: total length, 1,140 mm.; tail, 550 mm.; hind foot, 94 mm.
General distribution.--Southern México and Guatemala, south to Paraguay.
Distribution in Guatemala.--Now rather scarce in Guatemala but formerly occurred throughout the lowlands of both coasts, in Peten, and in the highlands up to 5,000 feet. Now scattered throughout the same territory, but most abundant in Peten.
Habitat.--Forest regions.
Habits.--The anteater spends part of its time on the ground and part in trees, descending to the ground in search of ant hills, which it rips open with its long hooked claws. It reaches into the recesses of the ant nest with its long snout and longer tongue to lick up the ants and termites, which make up its main items of food. On the ground it walks on the "knuckles" of its forefeet, with the long claws curved up, but walks on the soles of its hind feet. In trees it scrambles slowly over the branches, or progresses suspended beneath, sloth-fashion, using its tail as a fifth hand. It feeds mostly in the late evening or at night, but on occasions may be encountered abroad at almost any hour. It sleeps rolled up in a ball in the crotch of a tree or in a hollow tree.
Hunting.--It is a poor sportsman who shoots an anteater, for though it may make off at a surprising speed when startled on the ground, it has no defense or chance of escape from a gun. However, many are shot, simply because of their large size, and peculiar appearance. It is one of the most curious and interesting mammals of the Republic and is even now scarce in most parts. It should be afforded protection by law to prevent its extermination.
Remarks.--The Guatemalan race is mexicana.

39.
Names.--Latin: Myrmecophaga tridactyla
Guatemalan: Oso real
English: Great anteater

Description.--A large, curious looking mammal with an extremely long conical snout, small eyes and ears, long recurved claws, a long and bushy tail, and a peculiar color pattern, the rear half of the body and tail being blackish, the foreward half grayish, and with a black, white edged, band extending from the throat up over the shoulders and meeting on the lower back. The forefeet also are black.
Distinguishing characteristics.--Large size; very long, narrow snout; long, bushy tail.
General distribution.--Formerly from Guatemala south to Paraguay; now much restricted in range.
Distribution in Guatemala.--Probably does not occur today in Guatemala, though it is reported in the Pacific coast region between San José and the border of El Salvador.
Measurements.--Adults average: total length, 1,860 mm.; tail, 650 mm.; hind foot, 135 mm.
Habitat.--Tropical forests and swamp regions.
Habits.--Similar to those of the three-toed anteater (No. 38).
Hunting.--Because of its large size and peculiar appearance, the great anteater is persecuted by local hunters wherever it occurs. It is probable that it has already been exterminated from Guatemala, but, if it should be determined that any yet remain in the Republic, the species should immediately be extended complete protection under the law.
Remarks.--Probably the Guatemalan race was centralis.

40.
Names.--Latin: Dasypus novemcinctus
Guatemalan: Armado
English: Nine-banded Armadillo

Description.--A medium sized mammal; the body armored with a bony carapace of circular mosaic plates, and 8 or 9 movable transverse rings across the middle of the back. Tail long and armored, forefeet with four toes, face armored, and ears close together. Coloration grayish brown.

Distinguishing characteristics.--Medium size; circular armor plates; armored tail; normal sized claws on forefeet, ears close together.
Measurements.--Average measurements are: total length, 740 mm.; tail, 340 mm.; hind foot, 65 mm.; ear 35 mm.
General distribution.--From Louisiana in the United States, south through Central America to Argentina.
Distribution in Guatemala.--Common throughout the Republic from sea level to at least 9,000 feet elevation.
Habitat.--Prefers dry, brushy areas, but occurs also in moister situations in forest country.
Habits.--Armadillos subsist mostly on ants, insects, and grubs, many of which it obtains by digging little holes in the ground with its forefeet. Probably it also eats lizards and other small animals. It is a good digger; constructs burrows, usually around rocks or at the base of banks, or, where neither is available, in plain flat ground. It feeds mainly at night, and is seldom observed abroad in the daytime. When it senses danger, it immediately rushes for its burrow with amazing speed, considering its short legs and cumbersome shell. If overtaken, it rolls up within its shell to form an armored ball.
Hunting.--The meat of the armadillo is tasty, and the animal is much hunted by the Indians who pursue it at night with hounds. Often the animal is dug from its burrow, which is usually rather shallow. Few sportsmen go out in quest of armadillos, but everyone who uses hounds in hunting has had experience with the little beasts; for the hounds, when set on the fresh trail of a cat or deer, will often bring the hunter after a long chase to the mouth of an armadillo burrow, much to the huntsman's disgust.
Remarks.--The race occurring in Guatemala is mexicanus.

41.
Names.--Latin: Cabassous centralis
Guatemalan: Armado de zopilots
English: Naked-tailed Armadillo

Description.--A smaller mammal than No. 40, with the body armor consisting of a mosaic of square plates, the back with 10 to 12 movable transverse bands, the tail without armor, the face without armor except on the forepart. The ears are set far apart, and the front feet have five toes, which are armed with very large, broad claws.
Distinguishing characteristics.--Small size; square armor plates; unarmored tail; large claws on forefeet; ears far apart.
Measurements.--Average measurements are: total length, 406 mm.; tail, 106 mm.; hind foot, 63 mm.
General distribution.--From Honduras and possibly Guatemala south to Panamá.
Distribution in Guatemala.--Not surely recorded for the Republic; but reported from the mountains of Quiche, on the east side, and from the Pacific coastal plain, on the west.
Habitat.--Relatively dry forest and brush land and cleared land.
Habits.--Similar to those of the nine banded armadillo (No. 40).
Hunting.--See (No. 40). This species is probably too scarce in Guatemala to be of importance.

42.
Names.--Latin: Trichechus manatus
Guatemalan: ?
English: Manatee

Description.--A very large, heavy mammal adapted to an aquatic existence. Has flippers in place of the forelegs; no hind legs; no hair on the body; small ears and small eyes; and a tail in the form of a broad spatula.
Distinguishing characteristics.--Large size; bare skin; lack of hind limbs; spatulate tail; flipper-like forelimbs.
Measurements.--Adults are 7 to 12 feet in length, and weigh 400 pounds or more.
General distribution.--West Indies, and Caribbean coast of southern México, Central America and northern South America.
Distribution in Guatemala.--Caribbean coast and esteros, and Lake Izabal.
Habitat.--Shallow waters of warm tropical rivers and lagoons.
Habits.--The manatee is unable to leave the water and spends its whole life in an aquatic environment. It subsists on plant life, which it browses from beneath the surface of the water. Its movements are very slow and deliberate, and it is completely inoffensive.
Hunting.--The manatee is not a game mammal, but is occasionally shot by fishermen and other people in boats. Since it is becoming scarcer throughout its range, it should be afforded the protection of law immediately.

Key to the Large Mammals of Guatemala

The following key is designed to facilitate the identification of the larger species of mammals occurring in Guatemala. It consists of a series of paired statements which oppose each other, and only one of a pair can apply to any given mammal. It should be used in the following manner: Begin with the first pair of statements. If the first statement agrees with the specimen in hand, the name at the end of the statement is the name of the mammal. If the first statement does not fit, go on to the second of the apir. This should be applicable and the (2) at the end of the statement indicates that the next pair of statements, No. 2, should be tried. This pair leads either to pairs three or four, depending upon which is true of the mammal being keyed. By thus following through the key until the statement which fits the specimen in hand ends in a name, the specimen can be identified. The specimen may be identified in the first two or three pairs of statements, or it may be at the end of the key, No. 41. Any large mammal of Guatemala can be identified by this key, and then reference to the foregoing catalog will give a more complete description with range, habits, etc. of the mammal in question. For example, suppose a mammal has been killed which has four legs, a hairy body, a long hairy tail, only three claws on the front feet, a long snout, and a peculiar cream and black coloration. Begin at No. 1 in the key. The first statement does not fit, but the second does, since the animal has four legs. At the end of this statement are instructions to go on to the pair of statements No. 2. Again the second statement of the pair is true. The body is covered with hair, and there is no shell. Instructions at the end of the statement say to skip the third pair of statements and go on to No. 4. At No. 4 the first statement is false. The animal has a long tail, agreeing with the second of the pair. This leads to the pair of statements No. 15; all the intervening statements are skipped. Since the animal is hairy, the first statement of No. 15 does not apply, but the second does, leading to No. 16, which in turn leads to No. 19, for the tail is hairy. The first statement of the nineteenth pair obviously is true of the animal being checked, since it had three claws on the forefeet, and an unusually long snout. This leads to No. 20, and the unknown mammal is obviously *Tamandua tetradactyla*, the three-toed anteater, since the first of the pair of statements fits perfectly, and the second does not apply at all. In the same manner, any large Guatemalan mammal can be identified.

1. Possessing only two legs, and these in the form of flippers--*Trichechus manatus*. Possessing four legs (2).

2. Body covered with an armor-like shell (3). Body covered with hair, spines, or naked; but without shell (4).

3. Tail covered with armor plates--*Dasypus novemcinctus*. Tail naked, not covered with armor plates--*Cabassous centralis*.

4. Tail short, less than one-fourth of total length (5). Tail longer, more than one-fourth of total length (15).

5. Size very large; snout long; body scantily haired--*Tapirella bairdii*. Size no larger than deer; snout not long, body hairy (6).

6. Feet with hooves (7). Feet with claws, not hoofed (10).

7. Short legged; pig-like (8). Long legged; deer-like (9).

8. Coloration grayish; white collar around neck--*Tayassu tajacu*. Coloration reddish black; lips white; no collar--*Tayassu pecari*.

9. Large; darker above than below; antlers curved--*Odocoileus virginianus*. Small; dark throughout; antlers a simple spike--*Mazama sartorii*.

10. Underparts dark (11). Underparts white (13).

11. Underparts black; upperparts gray-*Grison canaster*. Underparts same as upperparts; not black (12).

12. Coloration reddish with white spots on sides--*Cuniculus paca*. Coloration brownish without white spots--*Dasyprocta punctata*.

13. Ears and hind legs extremely long--Lepus flavigularis. Ears and legs not particularly long (14).

14. Tail almost lacking; upper parts dark brown--Sylvilagus gabbi. Tail a conspicuous white puff; upper parts light brown--Sylvilagus floridanus.

15. Body covered with sharp spines--Coendou mexicanum. Body covered with ordinary hair or fur (16).

16. Tail naked and scaly for at least half its length (17). Tail hairy or furry (19).

17. Pelage with long guard hairs extending above fur--Didephis marsupialis. Pelage with no hairs extending above fur (18).

18. Coloration gray--Philander opossum. Coloration red--Caluromys derbianus.

19. Front feet with only three toes; snout very long (20). Front feet with five toes; snout no more than moderately long (21).

20. Tail short haired; body colored cream and black--Tamandua tetradactyla. Tail long haired, bushy; body gray and black--Myrmecophaga tridactyla.

21. Size small, body no more than 300 mm. long (22). Size large, body much more than 300 mm. long (27).

22. Tail less than one-half of total length--Sciurus deppei. Tail more than one-half of total length (23).

23. Red of under parts extending in a band up over the shoulders--Sciurus aureogaster. Red of under parts not extending to the upper parts (24).

24. Top of head between ears red--Sciurus socialis. Top of head between ears like rest of back (25).

25. Spot of red, buffy, or white at base of ear--Sciurus variegatoides. Base of ear same color as rest of back (26).

26. Under parts gray or black--Sciurus yucatanensis. Under parts reddish--Sciurus griseoflavus.

27. Tail bushy or long haired (28). Tail not bushy, short haired (32).

28. Head and neck whitish, rest of body black--Tayra barbara. Head and body same color (29).

29. Tail with contrasting rings of black and white or buff (30). Tail plain colored without rings (31).

30. Tail rather short, less than half of total length--Procyon lotor. Tail considerably more than half of total length--Jentinka sumichrasti.

31. Legs short; form delicate; size small--Urocyon cinereoargenteus. Legs long; form dog-like, not delicate, size large--Canis latrans.

32. Body covered with black spots (33). Body plain color, not spotted (35).

33. Neck spotted-Felis onca. Neck striped (34).

34. Tail long, almost one-half of total length--Felis wiedii. Tail not long, about one-third of total length--Felis pardalis.

35. Tail thick and tapering sharply from base to tip--Lutra annectens. Tail about the same thickness throughout (36).

36. Size large, body more than 650 mm. long; form cat-like (37). Size smaller, body less than 650 mm. long; form not cat-like (38).

37. Coloration tan or buffy brown--*Felis concolor*. Coloration red, gray, or dark brown--*Felis yaguarondi*.

38. Nose elongated--*Nasua narica*. Nose not elongated, face rounded (39).

39. Fur short, light yellowish brown--*Potos flavus*. Fur longer, coloration dark (40).

40. Color black throughout--*Alouatta palliata*. Color brownish or black and white, not black throughout (41).

41. Body black, face white; limbs and tail stout--*Cebus capucinus*. Body brownish; limbs and tail extremely long--*Ateles geoffroyi*.

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